No. 97

TELEGRAPHIC DETERMINATION

OF

LONGITUDES

IN

MEXICO, CENTRAL AMERICA, THE WEST INDIES,

AND ON THE

NORTH COAST OF SOUTH AMERICA.

1888-1889-1890.

No. 97. U. S.

BUREAU OF NAVIGATION—HYDROGRAPHIC OFFICE.

TELEGRAPHIC DETERMINATION

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MEXICO, CENTRAL AMERICA, THE WEST INDIES,

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NORTH COAST OF SOUTH AMERICA,

pliments of

JUAN DEL SUR; ST. NICOLAS
AO; AND LA GUAYRA,

RICHARDSON CLOVER,

Lieut. Commander, U. S. Navy,

STATIONS.

Hydrographer.

LES LAIRD, U. S. N.

A REPORT ON MAGNETIC OBSERVATIONS MADE AT VERA CRUZ; COATZACOALCOS; SALINA CRUZ; PORT PLATA; CURAÇAO; AND LA GUAYRA.

BY

Lieut. CHARLES LAIRD and Ensigns J. H. L. HOLCOMBE and L. M. GARRETT, U. S. N.

PUBLISHED BY ORDER OF

COMMODORE F. M. RAMSAY, U. S. N.,

CHIEF OF BUREAU OF NAVIGATION, NAVY DEPARTMENT.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1891.

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IN

MEXICO, CENTRAL AMERICA, THE WEST INDIES,

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NORTH COAST OF SOUTH AMERICA,

EMBRACING THE MERIDIANS OF

COATZACOALCOS; SALINA CRUZ; LA LIBERTAD; SAN JUAN DEL SUR; ST. NICOLAS MOLE; PORT PLATA; SANTO DOMINGO; CURAÇAO; AND LA GUAYRA,

WITH THE

LATITUDES OF THE SEVERAL STATIONS.

BY

LIEUTENANTS J. A. NORRIS AND CHARLES LAIRD, U. S. N.

TO WHICH IS APPENDED

A REPORT ON MAGNETIC OBSERVATIONS MADE AT VERA CRUZ; COATZACOALCOS; SALINA CRUZ; PORT PLATA; CURAÇAO; AND LA GUAYRA.

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INTRODUCTION.

GENERAL INTRODUCTION.

In continuation of the work of establishing secondary meridians by telegraphic measurement of differences of longitude, an expedition was sent out in 1883 by the Bureau of Navigation of the Navy Department, of which Bureau Commodore J. G. Walker, U. S. Navy, was at that time chief. A report of the work accomplished by this expedition, which was in charge of Lieut. Commander (now Commander) C. H. Davis, U. S. Navy, was published in 1885.[1] The object was to measure over the telegraph lines extending from Galveston, Tex., down the Gulf-coast of Mexico, across the Isthmus of Tehuantepec, and thence down the west coast of Central and South America to Valparaiso. This plan was carried out with the exception of the measurement between Vera Cruz, on the Gulf of Mexico, and La Libertad, on the Pacific coast of Central America. The delay, which would have been caused by crossing the Isthmus of Tehuantepec, where the methods of transportation were known to be primitive, or by going around via the Isthmus of Panama, would have seriously interfered with the remainder of the work, and this portion of the measurement was left to be completed at some future time. The positions of Vera Cruz and La Libertad were carefully established; the former from Galveston, and the latter from Panama. Upon the conclusion of this work the instruments were stored away at the Naval Observatory, and the officers employed were detailed for sea service.

In the spring of 1888 it was decided by Commodore Walker, who was still Chief of Bureau of Navigation, upon recommendation of the hydrographer, Commander J. R. Bartlett, U. S. Navy, to complete this chain of measurements by putting in the omitted links, and thus furnishing a verification of the positions on the west coast of Central and South America.

Lieut. J. A. Norris, who had been an observer in the former expedition, was placed in charge of the work, with instructions to collect the outfit of instruments and supplies Lieut. Charles Laird, another member of the former party, was detailed as an observer.

[1] Telegraphic Determination of Longitudes in Mexico and Central America, and on the West Coast of South America, by Lieut. Commander C. H. Davis and Lieuts. J. A. Norris and Charles Laird in 1883 and 1884. Bureau of Navigation, Washington. 1885.

Application was made through the Department of State to the Governments of the several countries for permission to land instruments and make observations at the desirable points. These were Vera Cruz, Coatzacoalcos, and Salina Cruz, in Mexico; La Libertad, in Salvador, and San Juan del Sur, in Nicaragua. The last-named point was not in the regular chain of measurements, but it was considered desirable to determine its position, as it was in the immediate vicinity of the Pacific terminus of the proposed Nicaragua Canal. The required permission was promptly and cheerfully granted by the Governments of the countries concerned.

Permission to use the telegraph lines of the Mexican and Central and South American telegraph companies for the exchange of time signals was asked and cordially granted; and to the assistance rendered by the employés of these companies, under orders from the main office in New York, much of the success of the work is due.

As the most favorable period for astronomical work in the portion of the tropics to be visited is during the winter or dry season, it was not desirable that the expedition should start until about the middle of November. This gave plenty of time for preparation, and the summer was passed in overhauling, cleaning, repairing, and testing the instruments formerly in use. These were found to be generally in fair condition, and, with the exception of the chronographs, were easily put in condition for use. The chronographs were found to be considerably out of repair, and being of an antiquated pattern, difficult of adjustment, it was decided to replace them with new ones. The model used by the U. S. Coast and Geodetic Survey was selected, and two of the instruments were purchased from Fauth & Co, of Washington.

In consequence of the necessity of crossing the Isthmus of Tehuantepec it was desirable to make the outfit as light as possible, and for this reason a tent was designed for astronomical work, to be used instead of the wooden observatories which had served in all preceding expeditions. One of these tents was supplied to each observing party and in use was found to possess all the desired qualities of convenience, stability, and lightness. Ordinary wall tents were also procured to be used as lodgings for the observers at points where it might be difficult or impossible to find inhabitable houses.

Soon after preparations for the field were begun, Commander Bartlett was detached from the Hydrographic Office and his place was taken by Lieut. George L. Dyer, U. S. Navy, who had been assistant hydrographer. Lieutenant Dyer took great interest in the work, was untiring in his efforts to supply the needs of the expedition, and placed at the disposal of Lieutenant Norris all the available resources of his office. It resulted from this that the outfit was very complete and work in the field was much facilitated. At his suggestion a set of instruments for magnetic observations, consisting of a magnetometer and a dip circle, was included in the list of instruments.

During the progess of these preparations a communication was received by the Navy Department from M. Fressinet, the manager of the Société Française des Telegraphes Sous-Marins in the West Indies, offering the use of the cable, which had just been completed, for the measurement of longitudes. This cable extends from Santiago de Cuba through Hayti, San Domingo, and Curaçao to La Guayra in Venezuela. As the preparations for the work in Mexico and Central America were so far advanced it was decided to proceed with that measurement and to accept the liberal offer of the French company for the following season.

Shortly before the date set for departure from the United States, Ensigns J. H. L. Holcombe and S. S. Wood, U. S. Navy, were detailed as assistants, and on November 17, 1888, the entire party sailed from New York for Vera Cruz in the Ward Line steamer *City of Washington.* The voyage was pleasant, but rather long, owing to delays at the numerous ports touched by the steamer.

Vera Cruz was finally reached on December 1. A heavy norther was just setting in, and though the members of the party succeeded in getting ashore, it was not possible to land the instruments for several days afterward. The officials of the custom-house had received instructions from their Government to allow the free entry of the effects of the expedition, and there was no delay experienced in getting possession of them after they were landed.

As soon as possible after landing official calls were made on the city authorities, who promptly granted permission to erect the observatory and courteously offered any assistance in their power. The expedition was greatly indebted at this point to Mr. H. Millard, the manager of the cable office, for many acts of kindness and courtesy. He was untiring in his efforts to aid the party in every way in his power.

It had been intended that one observing party should proceed immediately to Coatzacoalcos, while the other was making preparations for work at Vera Cruz. It was found, however, that the only steamer which plied between these ports had just left Vera Cruz, and the time of her return was problematical. She did not, in fact, arrive until the 15th of December, and was not ready for her return trip to Coatzacoalcos until the 21st. The time was occupied in setting up the observatory and instruments and making preparations for work. The site occupied by Lieutenant Commander Davis in 1883 was easily found. His pier had been left standing, and though considerably dilapidated and weather beaten, had not been moved from its original position. It was repaired with little trouble, the wooden observatory was set up around it, and the instruments mounted and adjusted. Lieutenant Laird assumed charge of this station, with Ensign Holcombe as his assistant. For use as a magnetic observatory the astronomical tent was set up on a square of open ground known as Baluarte Santiago near the southern limit of the city. Magnetic observations were begun as soon as these preparations were completed.

As soon as possible after the arrival of the steamer the outfit belonging to the Coatzacoalcos party was put on board, and on December 21 Lieutenant Norris and Ensign Wood sailed for that port. The steamer was small and indescribably dirty and uncomfortable, and the trip was exceedingly disagreeable, though fortunately of short duration, as the destination was reached the next morning.

Upon arriving the party was met by Mr. F. W. Carpenter, the manager of the cable office, who had made all arrangements for landing the instruments, etc. Like all employés of the telegraph company with whom the expedition came in contact, he was untiring in his efforts to aid in every possible way, and his assistance was of the greatest value.

Coatzacoalcos is a small town about 120 miles from Vera Cruz in a southeasterly direction. It is situated on the left bank of the river of the same name, which here flows nearly due north. It is only a short distance from the mouth of the river. A range

of low sand hills lies between the town and the Gulf. A light-house is situated on one of the highest of these hills near the mouth of the river.

The site for the observatory was chosen near the center of the town about 350 yards to the south and west of the light-house. The transit pier was built of bricks and Portland cement, and the wooden observatory was set up around it. For communication with the telegraph office, about a third of a mile distant, an insulated wire was extended on poles. The transit and other instruments were mounted and adjusted and all preparations for work were finally completed on December 28.

The weather on the Gulf coast of Mexico during the winter months is generally unfavorable for astronomical work owing to the frequent northers, which last anywhere from three days to a fortnight. These gales are of more or less violence, but always bring thick clouds and rain, and while they continue it is next to impossible to make star observations. After one gale ends and before the next one begins there are generally a few days when the wind is from the southward and the weather is fine. These were almost the only favorable opportunities for observation and every advantage was taken of them. The cable between Vera Cruz and Coatzacoalcos being short, the ordinary Morse telegraph instruments were in use, and it was possible to make an automatic exchange of time signals for the comparison of the chronometers. Whenever the weather remained clear, after the night's longitude work was completed, a number of observations were made for the determination of latitude. The stations being so near together and on the same coast, the weather conditions were similar, and when it was possible to observe at one place it was generally clear enough at the other also. The measurement was finally completed on January 17, 1889, observations having been made and time signals exchanged on six nights, viz, December 29 and 30, January 12, 15, 16, and 17.

Lieutenant Laird was then directed to proceed to Coatzacoalcos with his party and instruments by the first opportunity, and Lieutenant Norris made preparations for the journey across the Isthmus of Tehuantepec to Salina Cruz.

As the wooden observatory could not be transported it was left standing for the use of Lieutenant Laird, who was directed to ship it to the United States when he had completed his work. A like disposal was made of his observatory in Vera Cruz.

Before dismounting the instruments a meridian mark was placed on the brow of a hill north of the observatory for the convenience of Lieutenant Laird in adjusting his transit. A spot for his magnetic observatory was also selected and marked. The bearing and distance of the light-house from the transit pier were obtained by triangulation. The instruments were then packed and all preparations were made for the journey.

In crossing the isthmus the intention was to proceed up the Coatzacoalcos River in canoes as far as the small native village of Suchil, about a hundred miles. There a train of twenty-five pack mules was to be in waiting to transport the instruments, etc., another hundred miles to the town of San Geronimo, which was the terminus of the railway to Salina Cruz. This plan was successfully carried out. Progress on the river was slow, as the canoes had to be poled against the current, which in places was very swift. On the 22d of January the party left Coatzacoalcos and did not reach

Suchil until the evening of the 29th. The mule train arrived the next evening and and on the morning of the 31st a start was made for San Geronimo. The route for the first day was over a rough and muddy road, through the tangled intricacies of a tropical forest The mules being heavily laden, some of the instrument boxes weighing nearly 300 pounds, the rate of travel was necessarily slow. After the first day's journey a much better road was found, as it was on the line of the telegraph wire where the ground was kept clear of undergrowth. On the third day from Suchil the telegraph station at the village of Sarabia was reached, where the party was hospitably received by the station manager. A telegram was received here notifying Lieutenant Norris that Lieutenant Laird and party had arrived at Coatzacoalcos.

San Geronimo was reached on the evening of February 5. This town was the headquarters of Mr. F. Van Valkenburgh, the isthmus superintendent of the cable company. The party was received and entertained with the utmost hospitality by this gentleman and his charming wife.

The train for Salina Cruz left on alternate days, which gave the party a needed rest until the 7th. On that day a start was made at an early hour in the morning and the final destination was reached in the evening. A stop was made at the city of Tehuantepec, and in company with the United States consular agent, Mr. Albert Langner, an official visit was paid by Lieutenant Norris to the Jefe Político of the city.

Salina Cruz is the port of Tehuantepec and consists of a small collection of huts occupied by fishermen and laborers. The only houses of consequence belong to merchants who visit the place occasionally to superintend the loading or discharge of their ships. Nothing in the shape of a hotel or lodging house exists.

The cable house is on the beach nearly a mile from the town. It is a commodious structure of corrugated iron containing several rooms. It had been at one time used as an office and occupied by the corps of operators, but the office had been removed to Tehuantepec and it was vacant. Mr. Van Valkenburgh kindly gave the party permission to use it, arrangements were made with the proprietor of a hotel in Tehuantepec to supply meals, and the observers found it a very comfortable habitation.

A suitable site for the observatory was found near the house, inside the grounds belonging to it, a pier was built of bricks and mortar, and the astronomical tent was set up. Everything was ready for work on the evening of February 9, but owing to bad weather in Coatzacoalcos signals were not exchanged until the following night.

During the stay of Lieutenant Norris in Salina Cruz the weather was clear and, for astronomical work, nearly perfect. The northerly winds, which blow at that season almost constantly, seem to leave all their clouds and moisture on the north side of the ridge which extends from east to west across the isthmus. In Coatzacoalcos the weather continued more or less cloudy and rainy, but Lieutenant Laird succeeded in making observations on the nights of February 10, 12, 13, 14, 15, and 16, and the successful exchange of time signals on these nights rendered the measurement complete. Lieutenant Laird was then directed to proceed across the isthmus as soon as possible and occupy the Salina Cruz station, while Lieutenant Norris was on his way to La Libertad. After the completion of the longitude work at Salina Cruz, about ten days elapsed before the arrival of the steamer. This interval was employed in making latitude

observations, and in referring the position of the observatory to that of the observation spot on the Hydrographic Office Chart. The exact position of this spot was not shown, but it was referred to as being on the summit of the Morro Salina, a low hill near the village. A signal was placed on top of this hill, as near the center as possible, and a base line was measured near the observatory. From this the bearing and distance were obtained by triangulation in the usual way.

On February 26, Lieutenant Norris and party embarked on the Pacific Mail steamer *Clyde* and sailed for La Libertad. The distance is not more than 600 miles, but numerous stops were made, and much time consumed in taking in cargo, so that it was not until March 6 that the destination was reached. As usual the party was received by the Government officials with great cordiality and many offers of assistance. No delay occurred in landing the instruments and passing them through the custom-house. As this station had been occupied by Lieutenant Laird during the expedition of 1883–'84, a search was at once made for the transit pier which he had left standing. It was easily found from his description of the locality, but it was in a dilapidated condition, and had been moved from its original position. The plot of ground in which it stood had been converted into a corral for cattle and was consequently very dirty and unpleasant. It being necessary to build a new pier it was decided to select a more agreeable site, which was found in the yard in front of the telegraph office. The pier was built of bricks and cement, the observatory was set up, and the instruments mounted as soon as possible. As the spot selected for the pier was only a short distance from the beach, upon which there was frequently a very heavy surf, experiments were made to ascertain whether there was any perceptible tremor from this cause, but nothing of the kind could be detected. A careful triangulation was made to fix the bearing and distance between the old and the new piers.

Lieutenant Laird arrived in Salina Cruz on March 7, and was ready for work on the 10th. By this time the rainy season was approaching and there were signs of a change in the weather. It was frequently quite cloudy at night in La Libertad, and in Salina Cruz there were several showers No great delay was caused, however, and successful observations were made and signals exchanged on the nights of March 12, 13, 14, 16, 17, and 18, which completed the measurement. The mirror galvanometer was used in the exchange as the length of the cable precluded the use of the automatic method. No latitude observations were made here, the latitude having been determined by Lieutenant Laird on the former expedition.

After the completion of the work at La Libertad, several days were consumed waiting for the steamer to San Juan del Sur. At that season of the year La Libertad was not at all a pleasant abiding place. The heat was excessive both day and night and high mountains north of the town completely shut off all breeze. No rain had fallen for months, and the dirt in the streets was continually stirred up by the teams bringing coffee from the surrounding country. On March 26, the Pacific Mail steamer *Starbuck* arrived, and the party lost no time in getting on board of her.

San Juan del Sur was reached on March 29. The party was met on the steamer by the manager of the cable office, Mr. James Tiddy. He had been notified by telegraph from La Libertad, and had made all possible arrangements to facilitate the work.

A site for the observatory was selected in the grounds belonging to the cable company, and a pier was built immediately; the observatory and instruments were set up and everything was ready for work on the night of March 30. Observations were made and signals successfully exchanged on March 30, 31, April 1 and 2.

This concluded the work of the season. The instruments were dismounted and packed after the latitude observations had been made, and were shipped by freight to New York. Lieutenant Laird was directed to proceed with his party to Washington by the most practicable route. On April 9 Lieutenant Norris and Ensign Wood embarked on the Pacific Mail steamer *City of Panama* for New York via the Isthmus of Panama. After a pleasant trip the party arrived in New York on April 25, and proceeded at once to Washington.

Lieutenant Laird took passage to Acapulco, Mexico, in the coasting steamer of the Pacific Mail Line, and thence to Panama in the through steamer from San Francisco, arriving in New York on the 15th of May.

Work on the preliminary computation of the observations was at once begun, Lieutenants Norris and Laird reducing their respective time observations, Ensign Holcombe the magnetic work, and Ensign Wood the latitude.

The summer of 1889 was occupied by this work, and by the necessary preparations for the expedition to measure over the lines of the French company in the West Indies. As soon as the instruments arrived from Central America they were overhauled and repairs made where needed. Such slight additions were made to the outfit as experience had shown to be desirable. What proved to be a very important addition was a large tent, which was procured by requisition from the War Department.

It was known that the means of communication between some of the ports in the West Indies that it was desirable to visit were imperfect and unreliable, and it was decided by the Navy Department to detail one of the men of war of the North Atlantic fleet for the use of the expedition. The U. S. S. *Yantic*, Commander C. H. Rockwell, U. S Navy, commanding, was selected and proved to be admirably adapted for the purpose.

During the summer Ensigns Holcombe and Wood were detached from the party, and Ensigns L. M. Garrett and H. B. Wilson were detailed in their places.

On November 5, 1889, the expedition sailed from Washington on the U S. S. *Despatch* for Hampton Roads, where the *Yantic* was in readiness. This point was reached the next morning; the instruments and party were transferred immediately, and the same afternoon the *Yantic* sailed for Santiago de Cuba.

At about the time of departure of the expedition Commodore Walker was succeeded as Chief of Bureau of Navigation by Commodore F. M. Ramsay, U. S. Navy, and shortly after the hydrographer, Lieutenant Dyer, was relieved by Capt. Henry F. Picking, U. S. Navy.

The lines of the French cable company started from Santiago and extended to St. Nicolas Mole, on the northwest point of Hayti, thence to Port Plata, on the north coast of the same island, in the Republic of San Domingo. A land line connected this point with the City of Santo Domingo, on the south side of the island. From Santo Domingo a cable extended to the island of Curaçao, and thence to La Guayra, in Venezuela.

After a pleasant voyage the *Yantic* arrived at Santiago de Cuba on the 14th of November. As soon as possible a call was made upon the local authorities by Commander Rockwell and Lieutenants Norris and Laird, accompanied by the United States consul. It was found that as yet no notification as to the expedition had been received from the Spanish Government, but upon telegraphing to the governor general, at Havana, he at once sent instructions to show the party every attention and to render all assistance required. The office of the cable company was also visited. M. Fressinet was absent, but M. Pouyés, the manager of the office, received the party with great politeness and cheerful offers of assistance.

The position of Santiago de Cuba had been telegraphically determined in 1874 by the first expedition sent out by the Bureau of Navigation, under the command of Lieut. Commander (now Commander) F. M. Green, U. S. Navy. Lieutenant Norris had been a member of that party and was acquainted with the locality of the observation spot. This was about a half-mile south of the city near a small fortification known as Blanca Battery. The original transit pier had been removed, but it was found that a pier of masonry had been erected and left standing in nearly the right spot by some party of Spanish or Cuban surveyors. This was accordingly made use of by Lieutenant Laird, who was left in charge of the station, with Ensign Garrett as his assistant.

As soon as the *Yantic* had taken in a supply of coal and other necessary stores, a start was made for St. Nicolas Mole, Hayti, on November 17. This port was reached on the following evening, and the next day Commander Rockwell asked and obtained permission from the local authorities to land the instruments and make the observations. A suitable site was selected near the telegraph office, and the pier was erected as soon as possible.

St. Nicolas Mole is a small village, having little communication with the outside world. Supplies of any kind except fruit are difficult if not impossible to obtain. No suitable lodgings were to be had, so the large army tent was set up on the beach near the observatory, and proved a very comfortable habitation.

Lieutenant Norris had completed preparations for work on the night of the 23d November, but on the day preceding a telegram was received from Lieutenant Laird saying that he was ill with malarial fever, and would not be able to work for some days. Fortunately the attack was not serious, and he had recovered sufficiently to observe on the 25th. It had been hoped that time signals might be exchanged over this link by the automatic method, as the cable was short and in good condition. It was not found practicable, however, with the instruments possessed by the expedition, and use was made of the mirror galvanometer. Two or three nights were consumed in the attempt to work with the automatic system, but on the 28th it was abandoned and the mirror was successfully substituted. The weather was generally good, and no trouble was found in observing stars at either station. On the nights of November 28, 29, 30, December 1, 2, and 3, observations were made and signals exchanged, completing the measurement.

It had been the intention to make magnetic observations at Santiago de Cuba, but on account of the poor state of health of Lieutenant Laird, and the fact that yellow

fever had just broken out in the city, one of the first victims being M. Pouyés, of the cable company, it was deemed advisable for the party to leave the station with as little delay as possible. The magnetic observations were therefore reluctantly abandoned.

On the 4th of December the *Yantic* sailed for Santiago, took Lieutenant Laird and party on board and conveyed them to Port Plata, arriving at that point on the 9th. While at Santiago, Commander Rockwell received instructions from the Navy Department to survey a small harbor on the south coast of Cuba, and as soon as he had landed Lieutenant Laird at Port Plata he left to carry out his orders.

The climate of Port Plata was found by Lieutenant Laird to be decidedly unfavorable for astronomical work. Rain was almost continuous while he was getting ready for work, and most of his star observations were made in the short intervals between showers. By taking advantage of every opportunity he succeeded in working on the nights of December 14, 15, 16, 19, and 20. No trouble from the weather was experienced at St. Nicolas Mole. Showers were frequent during some of the nights, but always passed over very quickly. While the Port Plata party was getting ready for work, Lieutenant Norris determined the latitude of St. Nicolas Mole.

On the 20th of December Commander Rockwell arrived with the *Yantic* from the Cuban coast, and on the 21st Lieutenant Norris and party embarked for Santo Domingo City.

This point was reached on the evening of December 24th, but it was several days before anything could be done in preparation for work. The week between Christmas and New Year's was a general holiday for the inhabitants, and it was next to impossible to find anyone willing to work. The *Yantic* was unable to get over the bar into the river, and her position outside in the open roadstead was very uncomfortable owing to the continuous heavy swell. As it was very necessary to make some repairs to her boilers which could only be done in smooth water, Commander Rockwell landed the party as soon as possible and then proceeded to Samana Bay, where there was a good harbor.

Immediately after landing a call was made on the President of the Republic, who courteously offered every assistance. A site for the observatory was speedily selected near the foot of the old signal tower. As soon as workmen could be procured the pier was built and the instruments were mounted and adjusted and a wire was extended to the telegraph office about 200 yards distant.

It had been found upon arrival at this point that the overland telegraph line to Port Plata did not belong to the same company that operated the cables, but to a separate organization. A call was made upon the resident director of this company, M. Gassend, and the object of the expedition explained to him, upon which he at once placed the line at the disposal of the party.

As in the case of most land telegraph lines through a tropical country, the wire was frequently broken, or insulation destroyed, and interruptions to traffic were many. It was found that all messages between Santo Domingo and Port Plata were repeated at La Vega, a station about two-thirds of the distance from the former place. The operators were unanimously of the opinion that it would be impossible to work over the whole line, unless it happened to be in unusually good condition. As it was

not desirable to have the time signals repeated at La Vega if it could be avoided, it was decided to try the mirror galvanometer, it being delicate enough to be influenced by any current that could get through. This was also considered impracticable by the telegraph operators, but on trial it was found to work perfectly. No difficulty was experienced in exchanging signals, though the insulation of the line was so faulty that it was necessary to use from ten to fifteen LeClanché cells at each end.

Bad weather at Port Plata delayed the work somewhat, but observations were made and signals exchanged on the nights of January 2, 3, 4, 5, and 6, which completed the measurement. While waiting for the Santo Domingo party to get ready for work, Lieutenant Laird determined the latitude of Port Plata, and also made magnetic observations.

As soon as the longitude observations were finished, Commander Rockwell proceeded in the *Yantic* to Port Plata, took Lieutenant Laird and party on board, and sailed for Curaçao, arriving on January 17.

The authorities at Curaçao took special pains to facilitate the work, and Lieutenant Laird was ready for observation on the 20th. No bad weather was encountered at either place, and the longitude measurement was completed in six consecutive nights, ending January 25.

It had been intended that Lieutenant Laird should remain at Curaçao while Lieutenant Norris proceeded in the *Yantic* to La Guayra, but as it was particularly desired by the Hydographic Office that magnetic observations should be made at the latter place, it was finally decided that Lieutenant Norris should remain at Santo Domingo. Lieutenant Laird was directed to proceed to La Guayra after finishing the magnetic and latitude work at Curaçao. The cables were to be connected at Curaçao, and the measurement made direct from Santo Domingo.

This plan was carried out successfully. Lieutenant Laird reached La Guayra on the 2d of February, and was ready for work on the 6th. Some defect in the connections prevented the exchange of signals on that night; on the 7th, 8th, 10th, and 11th the work was satisfactory, and the measurement was completed. On the 9th no signals were exchanged on account of the failure of the operator at Curaçao to connect the cables together.

As soon as he had completed the latitude and magnetic work at La Guayra, Lieutenant Laird embarked on the *Yantic*, which was in readiness Santo Domingo was reached on February 21; Lieutenant Norris and party were received on board, and the ship sailed the same evening for Key West. This port was reached two weeks later.

By directions from the Navy Department, the instruments were shipped to Washington by steamer, and the officers of the expedition proceeded to the same place by rail, arriving on March 11.

As has been said before, the members of the expedition, throughout the progress of their work, were the recipients of many acts of courtesy and kindness. To mention all to whom they are indebted for such acts would be to make a list of nearly everyone met. Special acknowledgment is due, however, to the president and officials of the Mexican and Central and South American cable companies in New York. These gentlemen,

knowing the difficulties to be encountered in the countries where their lines were situated, sent instructions to all their stations in Mexico and Central America to aid in the work in every possible way; consequently, upon arrival, the party found in every case that all difficulties had been swept away as if by magic. The employés were never weary in assisting by all means in their power, and by their hearty co-operation many otherwise serious obstacles were easily surmounted. Special thanks are due to Mr. Cummings, general manager of the companies in the city of Mexico; to Mr. Henry Millard, manager at Vera Cruz; to Mr. F. W. Carpenter, at Coatzacoalcos; to Mr. Atherton, at La Libertad, and to Mr. James Tiddy and Mr. Kelley, at San Juan del Sur.

To Mr. F. Van Valkenburgh, isthmus superintendent of the lines, the debt of the expedition is still greater, as by his aid what promised to be the most difficult part of the journey—the crossing of the isthmus—was rendered comparatively easy.

Special thanks are also due to the officials and employés of the French companies in the West Indies, who granted all necessary facilities, and cheerfully aided in all ways in their power. Prominent in courtesy where all were courteous, may be mentioned M. Raymond Wallut, administrateur of the Société Française des Telegraphes Sous-Marins, and M. Gassend, the resident director in Santo Domingo of the Compagnie Telégraphíque des Antilles. At Santiago de Cuba, upon the breaking out of yellow fever, there was some temporary confusion in the French cable office, owing to the death of the manager, M. Pouyés; and the thanks of the expedition are due to Mr. Beall, of the English cable company, who generously offered his services as an operator, and contributed greatly to the success of the work.

Special acknowledgment is to be made to His Excellency N. Van den Brandenhof, governor of Curaçao, who manifested much interest in the work, and materially assisted in many ways.

As was to be expected, the consular representatives of the United States were uniformly zealous in aiding the party to carry out its work. Special mention must be made, however, of Mr. Otto E. Reimer, consul at Santiago de Cuba, who, by his energy, zeal, and knowledge of the country and people, aided most materially in bringing the work at his station to a successful termination. Thanks are also due to Mr. Albert Langner, consul at Tehuantepec; Mr. Emile Courtade, consul at La Libertad; Mr. Holmann, consul at San Juan del Sur; Mr. Thomas Simpson, consul at Port Plata; Mr. Juan A. Read, vice-consul at Santo Domingo; Mr. L. B. Smith, consul at Curaçao, and Mr. W. S. Bird, consul at La Guayra. The party at Santo Domingo is also indebted in many ways to Mr. Nathan Appleton, of Boston, who at that time was engaged in building a railroad from the city to the interior of the island.

Last, but by no means least, the kindness with which the members of the party were received on board the *Yantic* by Commander Rockwell and his officers, and the valuable assistance which they cheerfully rendered on all occasions were fully appreciated at the time, and will always remain among the most pleasant recollections of the expedition.

DESCRIPTION OF THE STATIONS.

VERA CRUZ.

The site selected for the observatory at Vera Cruz was that used by Lieutenant-Commander Davis in 1883. (See Plate.)

The pier, inside Fort Conception at the north end of the city, was found standing, but in bad repair. It was rebuilt and capped with a marble slab. The center of the pier was 39 feet S. and 20.5 feet E. (true) of the gun pivot in the northwest salient of the fort. From the center of the pier the vane of San Juan de Ulua light-house bore N. 63° 45′ 20″ E. (true), distant 3,488.2 feet.

Connection was made with the telegraph office by means of an iron wire stretched on insulators from the parapet of the fort over the roof of the railway station and thence to the office.

The pier was left standing, but can not be considered as a permanent mark.

COATZACOALCOS.

The observatory was placed in a street near the center of the town, about 500 yards from the landing place on the river. (See Plate.)

The pier was built of bricks and Portland cement, the latter brought from Vera Cruz. The light-house was in plain sight from the observatory. The magnetic observatory was placed about 50 yards north of the transit pier and in the same meridian. A telegraph line extended to the cable office about a third of a mile distant. From the center of the transit pier the center of the light-house bore N. 15° 58′ E. (true), distant 1,013.8 feet.

At the conclusion of the work the pier was left standing, and it is hoped that it may remain as a permanent mark.

SALINA CRUZ.

The transit pier was built of bricks and mortar of native manufacture, by a native bricklayer. It was situated in the northeast corner of the grounds belonging to the cable company, at a distance of about 50 yards from the cable house. (See Plate.) To the north was a low range of hills, and to the south, about 200 yards distant, was the Pacific Ocean. The magnetic observatory was placed in the meridian of the transit instrument, about 30 yards to the south. From the center of the transit pier the observation point on Morro Salina bore S. 65° 10′ W. (true), distant 7,395.1 feet.

The transit pier was left standing and is not likely to be disturbed.

LA LIBERTAD.

The observatory was located near the center of the small yard, in front of the telegraph office, between that building and the beach. (See Plate.) Before finally deciding upon this site, experiments were made to ascertain whether or not the heavy surf on the beach, only 20 or 30 yards away, would produce sufficient vibration of the

ground to affect the instruments. It was found that there was no perceptible effect, and the pier was built and the observatory and instruments set up. A double wire was extended to the telegraph office only a few yards distant.

A careful reference was made by triangulation to the site of the old pier used in 1884 by Lieutenant Laird, with the following result. From the center of the new pier the old pier bore N. 9° 13′ W. (true), distant 279.8 feet.

This pier was left standing and is not likely to be removed

SAN JUAN DEL SUR.

The telegraph station at this point was shut in by trees to the north and by hills to the south. A convenient point was found in the yard, however, where by cutting down a tree a good view of the northern sky was obtained. The pier was built of brick and cement. A strong north wind was blowing most of the time, and it was necessary to secure the observatory tent by additional guys on the weather side.

The old observation spot marked on the chart could not be exactly identified, so reference was made by triangulation to the signal station and light-house on a hill south of the harbor. From the center of the transit pier the signal station bore S. 44° 51′ W. (true), distant 2,991.4 feet.

The pier was left standing and will probably remain as a permanent mark. (See Plate.)

SANTIAGO DE CUBA.

The station at Santiago de Cuba was in the rear of the Blanca Battery, about half a mile to the southward of the city. (See Plate.) This site had been used by Lieutenant-Commander Green, U. S. Navy, in 1875. The pier used by him had been removed, but near the same spot another had been erected by Spanish officers. This latter was used.

Through the courtesy of the manager of the West Indian and Panama Cable Company at this station the line extending from the cable hut to their office was used for connecting with the French telegraph office.

A loop was run from the observing tent to the cable hut, about 125 yards distant, and by means of an arrangement of switches the telegraph instruments in the tent could be connected up at pleasure. Every evening the line was connected with the cable of the Société Française des Télégraphes Sous-Marins at the office and the signals exchanged from the observing tent. The sheathing of the West Indian and Panama cable was used as an earth.

From the center of the pier the southeast corner of the battery inclosure bore N. 45° 44′ W. (true), distant 105.1 feet.

The pier was left standing, and, as it is in the grounds connected with the fort, will probably remain as a permanent mark.

ST. NICOLAS MOLE.

The observatory was located in the middle of one of the streets near where it terminated on the beach on the north side of the village. The outlook to the north

was over the bay. The pier was built of bricks and cement. A double wire was extended to the telegraph office, about 40 feet distant. (See Plate.)

By triangulation the flagstaff of Fort St. George was found to bear from the pier N. 89° 29′ W. (true), distant 1,117.5 feet.

This pier was left standing and will probably remain for some time. Although it is in the middle of a street there is no traffic of any kind to interfere with it.

PORT PLATA.

The observatory was placed on the promontory to the north of the city. (See Plate.)

The pier was built of brick and cement. Connection was made with the telegraph office, about 320 yards distant, by means of an insulated wire stretched from house to house.

From the center of the pier, the light-house near the signal station bore N. 33° 28′ 15″ W. (true), distant 565.4 feet, and the cross of the Catholic church bore S. 1° 28′ 15″ E. (true).

The pier was left standing, but can not be considered as a permanent mark.

SANTO DOMINGO CITY.

One of the most notable features in this place is the large square signal tower, on the right bank of the Ozama River near its mouth. It was built by the first Spanish settlers during the time of Columbus. A room is shown in the building which is said to have been the place of confinement of Columbus before he was sent as a prisoner to Spain. At the foot of the tower is a large parade ground, surrounded on the landward sides by extensive barracks now in a more or less ruinous state. On this parade ground a short distance south and west of the tower was located the transit pier. (See Plate.) It was an excellent situation, having a clear north and south view, and very quiet and free from interruption. The pier was built of bricks and cement. A wire was extended along the barrack walls to the telegraph office.

The reference point given on the Hydrographic Office Chart is the iron light-house on the south side of the city, about a quarter of a mile distant from the mouth of the river. The bearing and distance of this light-house from the signal tower were obtained from a civil engineer who had made a careful survey of the city. The bearing and distance of the tower from the transit pier were measured directly with the following results: From the transit pier the southwest angle of the tower bore N. 50° 48′ E. (true), distant 219.4 feet. From the pier the light-house bore S. 43° 2′ W. (true), distant 1,583.2 feet.

The pier was left standing, and will probably not be removed.

CURAÇAO.

The site selected for the observatory at Curaçao was in the open space in front of the governor's mansion. (See Plate.) The center of the pier was 55 feet 3¾ inches W. (true) from the inner western angle of the entrance gate to the inclosure, and the

distance in the meridian line north to the edge of the sea wall was 21 feet, 7¾ inches. The vane on the Riff Fort light-house bore from the center of the pier S. 80° 45′ 30″ W. (true), distant 1,148.7 feet.

Connection was made with the telegraph office by means of an insulated wire.

At the conclusion of the work at Curaçao the pier was removed.

LA GUAYRA.

The observatory was situated near the northeast corner of the vacant lot to the eastward and adjoining the market. The railroad to Macuto passed between the observation spot and the sea wall. (See Plate.)

No direct measurement to the light-house in present use could be made, so the position of the observation spot was referred to the light-house situated about 100 yards to the eastward of the shore end of the breakwater.

The center of the pier was 119 feet 1 inch S. (true) from the outer face of the sea wall, and the above-described light-house bore N. 72° 17′ W. (true), distant 1,212.8 feet.

The pier was built of the usual material, and connection made with the telegraph office as at the other stations.

Upon the conclusion of the work all traces of the pier were removed.

DESCRIPTION OF THE INSTRUMENTS.

MERIDIAN INSTRUMENTS.

At all the stations occupied by the expedition, two of the meridian instruments made by Stackpole, of New York, for the Transit of Venus Commission in 1874 were used.

These instruments have a focal length of 30 inches, and an aperture of 2½ inches. The eyepiece is at the end of the axis, so that the observer always retains the same position. They possess the advantage of great stability; when once adjusted in the meridian there is no necessity of readjusting in azimuth, under the ordinary conditions. The zenith telescope level and micrometer attached to the instrument enabled it to be used for the latitude determinations. These instruments were originally fitted with reticules of spider lines, but on a former expedition the danger of injury in transportation was so clearly shown that these were replaced by ruled glass diaphragms, the lines of which were arranged in groups as follows: One, three, seven, three, one. The middle group of seven was the only one used in observing transits for time.

A spare transit, a combined transit instrument and zenith telescope, designed by Mr. J. A. Rogers in 1873 for the U. S. Hydrographic Office, was taken with the advance party of the expedition to be used in case of accidents.

CHRONOMETERS.

The time pieces used by the expedition were four break-circuit sidereal chronometers, and two break-circuit mean time chronometers, made by Negus.

The break-circuit sidereal chronometers are the same that have been used on all the expeditions sent out by the Bureau of Navigation since 1874. They have given the greatest satisfaction, and the rates under the trying circumstances of marked change in temperature and condition have been generally regular.

CHRONOGRAPHS.

Two cylinder chronographs, manufactured by Fauth & Co., were used. These instruments are easily regulated, of light weight, can be wound without being stopped, and by pushing a button the speed of the cylinder can be doubled.

INK WRITERS.

Each party carried a Siemens polarized ink writer. These instruments were originally purchased for use on the Brazilian land lines in 1879. Since then they have been carried on every expedition sent out by the Hydrographic Office. They have been found most useful, not only as a telegraph instrument, but also have been made to serve as a chronograph and used as a polarized relay on both land lines and cables where the feeble current demanded an extremely delicate relay.

BATTERIES.

Each party carried twenty-four gravity cells made of vulcanite packed in boxes containing twelve each, together with a supply of coppers, zincs, and copper sulphate.

PORTABLE OBSERVATORIES.

The wooden observatories that had been in use on all previous expeditions were used at the stations of Vera Cruz and Coatzacoalcos. These huts were made to put together in sections, each side and top being composed of two sections; the sides were bound together with cross pieces held in place by iron knees The sections of these observatories were too bulky to be packed over the mountains, so they were shipped to the United States after the conclusion of the work at the above-named stations. At the other stations of the Mexico-Central American expedition, two observing tents, designed by Lieut. J. A. Norris, were used. They proved so satisfactory that the wooden observatories were discarded and the tents alone taken on the West Indian expedition.

The parts of the frame of these tents, together with the connections, were interchangable; the whole set on a solid foundation of sills floored over. A slit 1 foot wide, commencing 3 feet from the floor extended across the roof from side to side, 4 feet from one of the ends. This arrangement gave sufficient sweep for the transit instrument in both azimuth and altitude, and allowed ample space at the other end of the tent for the tables, chronometers, chronograph, and telegraph instruments. Three tables, capable of being taken apart for packing, were furnished with each tent.

All metal fittings were made of composition, in order that the tents could be used to cover the magnetic instruments. The severe strain these tents have been put to whilst in service shows that they are admirably adapted for the work.

Each party was supplied with a wall tent to be used as a habitation when necessary. One of the wall tents, worn out during the first season's work, was replaced through the courtesy of the War Department by a regulation hospital tent.

TRANSIT PIERS.

A pier of brick and cement, 24 inches by 22 inches and 36 inches high, was built at each station as a foundation for the transit instrument.

On this and previous expeditions it was found necessary at some of the stations for the officers to build the pier themselves. To facilitate matters, bricklayer's tools, a marble slab, and, when there was a probability of not being able to procure material, bricks and cement were carried as part of the outfit.

MISCELLANEOUS ARTICLES.

Besides the articles above enumerated, each party carried an aneroid barometer, a thermometer, a plug switch-board, several relays of different resistance, detector galvanometers, a break-circuit chronograph key, a supply of insulated copper wire, screw posts, binders, insulators, a theodolite, a surveyor's chain, and a supply box containing tools, lanterns, oil cans, etc.

The party in charge of Lieutenant Norris carried a complete photographic outfit.

The party in charge of Lieutenant Laird carried the latest pattern of Kew unifilar magnetometer and a Barrow dip circle.

INSTRUMENTAL CONSTANTS.

The values of the flexure and inequality of pivots and of the revolutions of the micrometer screws of transit instruments Nos. 1503 and 1504 were obtained from Prof. William Harkness, U. S. Navy, of the Transit of Venus Commission. He also furnished the original recorded values of the divisions of the levels, but it was found that some of the scales had been interchanged, while others had been broken and replaced by new ones, so that it was necessary to redetermine these values. The striding level tube of No. 1504 used by Lieutenant Laird caused a great deal of trouble by leakage. It was refilled several times, but could not be sealed tight enough to prevent the escape of the liquid. In consequence of this, Lieutenant Laird was several times compelled to substitute the tube of the zenith telescope level for the defective one, sometimes using it with its own scale and sometimes with the other. From this cause several different values of the level divisions enter into his work. The values of all the levels were determined by observations of a terrestrial object, some made in the field during the progress of the work and others after returning to Washington. These were verified by measurements made with the mural circle at the Naval Observatory at Washington.

The values adopted are as follows:

LEVELS, TRANSIT NO. 1503.

		s.	"
Striding level	1 division =	0.076 =	1.14
Zenith telescope level	1 division =		1.53

LEVELS, TRANSIT NO. 1504.

		s.	"
Striding level with proper scale	1 division =	0.091 =	1.36
Zenith telescope level with proper scale	1 division =		1.35
Zenith telescope tube with striding scale	1 division =	0.084 =	1.26
Striding tube with zenith telescope scale	1 division =		1.14

FLEXURE AND INEQUALITY OF PIVOTS.

	s.
No. 1503. Flexure (f) + inequality of pivots, circle East	= +0.315
No. 1504. Flexure (f) + inequality of pivots, circle East	= +0.283

MICROMETER SCREWS.

	"
No. 1503	1 revolution = 68.89
No. 1504	1 revolution = 69.36

EQUATORIAL THREAD INTERVALS.

In the following table the equatorial intervals from the mean of the threads are given. The threads are numbered in the order in which they would be crossed by an equatorial star, in the position of the instrument circle East. These intervals were determined by many observations of the transits of circumpolar stars. They were determined separately for each season's work, but as will be seen differ only slightly:

Threads.	Transit No. 1503.		Transit No. 1504.	
	First season.	Second season.	First season.	Second season.
	s.	s.	s.	s.
I	−13.854	−13.834	−12.195	−12.144
II	− 9.231	− 9.251	− 8.064	− 8.054
III	− 4.580	− 4.636	− 4.058	− 4.024
IV	+ 0.008	− 0.001	+ 0.032	+ 0.034
V	+ 4.632	+ 4.635	+ 4.066	+ 4.007
VI	+ 9.238	+ 9.250	+ 8.091	+ 8.004
VII	+13.832	+13.839	+12.164	+12.167

METHODS OF OBSERVATION.

OBSERVATIONS FOR TIME.

Upon arrival at a station the first care was to select a suitable site for the observatory. It was necessary that there should be a clear view of the heavens in the line of the meridian from the zenith to as near the horizon as possible. It was desirable that the situation should be secluded to avoid annoyance from idle and curious inhabitants, and to obviate the necessity of a long telegraph wire it was well to get as near as possible to the telegraph office. A site with these advantages being found, permission to use it was obtained from the proper authorities. A meridian line was then laid

out by compass and the transit pier was built. As soon as this was completed the observatory was erected over it and the instruments were mounted, batteries were set up, and the chronometer and chronograph connections were made. The level and collimation of the transit instrument were adjusted and a wire was extended to the telegraph office. On the first clear evening the transit was set in the meridian by repeated observations of zenith and circumpolar stars, and the chronometer correction was obtained.

All preparations being complete at each end of the line, the method of work was generally as follows: If the weather was clear, and likely to remain so, the observer would begin work at any convenient time after dark, usually from 7 to 8 p. m. If it was likely to be cloudy, observations were begun as soon after sunset as possible. Five or six time stars and two or three circumpolars were observed, the striding level being frequently applied and read. Then the instrument was reversed in the Y's and about the same number of stars observed in the new position. If the nights were clear this could be done within less than two hours, but when the weather was cloudy the observations would frequently extend over six or eight hours.

From the terms of the agreement with the telegraph companies the lines could be used for the exchange of time signals only after their day's work was finished. On the lines in Mexico and Central America this was generally quite late at night, usually between 11 p. m. and midnight, except on Sunday, when the work was finished earlier. On the lines in the West Indies the work was generally over by 8 p. m.

On the line between Vera Cruz and Coatzacoalcos and thence to Salina Cruz the instruments used were the ordinary Morse relay and sounder, and between these places the signals were exchanged automatically. Connections were made at both ends of the line in such a way that the chronometer at one observatory would register its second beats upon the chronograph at the other, which chronograph was at the same time registering the beats of its own chronometer. This was done for a certain number of minutes and the connections were then changed by means of switches, so that the operations were reversed. For this purpose the telegraph instruments and connections were in the respective observatories, and the wire leading therefrom was simply connected at the office with the main line. One of the telegraph operators would do this and then go to the observatory to do the necessary talking.

Where mirror signals were used the arrangement was different. The mirror was set up in the telegraph office and connected to the key and to the main line in the regular way. This key was in its main features like the ordinary cable key with two levers, and could be used for the regular telegraphic work. It had, however, an extra contact point which was connected with the wire leading to the observatory in such a way that by pressing one of the levers of the key an impulse would be sent over the cable, and at the same instant a mark would be made on the chronograph in the observatory, thus recording the exact time at which the impulse was sent.

The observer at the other end of the line would see the result of this impulse in the form of a movement of the light reflected from his mirror, and would record the time of his perceiving it by pressing a key connected with the chronograph circuit in his observatory.

The exact procedure adopted was for the first observer to press his cable key at intervals of two or three seconds for fifteen times, then a pause of eight or ten seconds and another set of fifteen pressures, and so on until seventy-five signals had been sent in groups of fifteen. The other observer recorded all this on his chronograph, and then in his turn sent seventy-five signals in the same way. The next day each observer sent to the other by telegraph the even minute which preceded the first signal that he sent, and also the one that followed the last signal.

It was found that the agreement between the signals received by an observer was generally quite close, not often differing from the mean by as much as a tenth of a second. A few discordant ones would usually be found, generally at the beginning of the groups of fifteen; these were rejected, and the final result would be from the consideration of about seventy signals sent each way.

For a more full description of the methods of exchanging signals the reader is referred to the report of the longitude expedition of 1883-'84, mentioned in the foot-note on page 5.

LATITUDE OBSERVATIONS.

For latitude work an observing list was prepared showing the pairs of stars available, in the order of their right ascension, giving their zenith distance and the setting of the instrument, and the approximate time of culmination.

Stars were selected which were within 25° of the zenith, but those used were generally much nearer than that. The stars of a pair did not differ in zenith distance more than twenty minutes of arc, and were from two to fifteen minutes apart in right ascension. On clear nights latitude observations were generally made after the time work had been finished. When this was impracticable a few nights were employed after the conclusion of the longitude work. The method of observation was to set the instrument at the mean zenith distance of a pair of stars just before the first one entered the field; the zenith telescope level was adjusted so that the bubble was brought to the middle of the tube. When the star appeared it was followed by the micrometer thread and bisected as it crossed the middle transit thread. The micrometer and level were then read and recorded and the instrument reversed The second star was observed in the same manner, using the same micrometer thread. The chronometer time of each transit was also recorded. This constituted one observation for latitude, and as many were made at each station as circumstances would permit.

TRIANGULATION.

From the nature of the conditions governing the selection of sites for the observing stations, they were frequently placed in secluded localities, and as the piers could not generally be considered as permanent, it was necessary to reduce the latitude and longitude obtained by observation to some prominent and well-established landmark. At most stations the point chosen was that fixed on the Hydrographic Office Chart of the place, or that given in the list of positions published by the Hydrographic Office.

In making these measurements the bearing was usually obtained by reference to a meridian mark established with the transit, and the distance was either measured directly, or else the ordinary method of measuring a base line and angling from its

ends with a theodolite was employed. The bearing and distance at each station of the chosen landmark from the center of the transit pier are given in the description of the stations.

PERSONAL EQUATION.

As in most of the longitude measurements made under the direction of the Bureau of Navigation, no correction for personal equation has been introduced in the following computations. The observers had no method of obtaining a value for this changeable quantity while in the field, and it was, therefore, considered better to omit it altogether rather than put in an arbitrary quantity obtained from observations made before the starting of the expedition or after its return. If circumstances had permitted the exchange of stations by the observers in the middle of each measurement, it would have been the best way of eliminating error from this cause, but it was manifestly impossible to do so, from lack of time and from other considerations. As far as possible the observers were located alternately east and west of each other, thus probably diminishing, if not eliminating, the error at every second station. The measurements made between Santiago de Cuba and Curaçao, as also between Santiago de Cuba and La Guayra, were four in number, Lieutenant Norris being alternately east and west of Lieutenant Laird; consequently the longitudes of Curaçao and La Guayra, as derived from Santiago de Cuba, may be considered substantially free from the effects of personal error. In the measurement between Vera Cruz and La Libertad, Lieutenant Norris was first east, then west, and then east again of Lieutenant Laird; hence, the longitude of La Libertad, as derived from Vera Cruz, is liable to correction for the difference of personal equation between Norris east and Laird west. San Juan del Sur is in the same category with La Libertad, the longitude being derived by the same number of measurements from Vera Cruz.

METHODS OF REDUCTION.

REDUCTIONS OF TIME OBSERVATIONS.

The reduction of all the time observations was made by Lieutenants Norris and Laird and Ensign Garrett. Lieutenant Norris reduced all his own observations; Lieutenant Laird reduced the observations made by him during the work of the first season, while Ensign Garrett reduced those made by Lieutenant Laird during the last season.

The chronograph sheets were read twice and compared with the record. To the observed time of transit of each star reduced to the mean of the threads were applied the flexure of the axis and inequality of pivots, level, azimuth, collimation and diurnal aberration, and hourly rate The difference between the reduced meridian passage of each star and its right ascension gave a value for the clock correction at the epoch to which all the observations of that night were reduced.

Each star then furnished an equation of condition for the final reduction to determine the corrections to be applied to the assumed values of the azimuth and collimation constants and the mean clock correction. These equations were solved by the method of least squares, and with the corrected values of the collimation and azimuth constants, a new clock correction for each star was obtained. The mean of these corrections, rejecting circumpolar stars, was the finally accepted clock correction.

The weight unity was assigned to all time stars and the circumpolars were weighted for declination.

The hourly rate was obtained graphically by the construction of a curve. For this purpose all the time observations made at each station were reduced and the differences between the clock corrections on the several nights deduced from the time stars alone, gave the data for determining the known points of the curve. The middle time of the signals sent and received at each station was the *epoch of comparison;* and the middle time of the observed times of transit of clock stars was the *epoch of reduction* on the same night. The clock correction was reduced from the epoch of reduction to the epoch of comparison by applying the product of the hourly rate, taken from the curve, multiplied by the elapsed time expressed in hours.

REDUCTION OF LATITUDE OBSERVATIONS.

The reduction of the latitude observations was made by Ensigns Wood and Wilson; Ensign Wood reducing those made during the first season's work, and Ensign Wilson the remainder.

The stars used were originally selected from the British Association Catalogue. In reducing the observations the declinations were taken from the Nautical Almanac, the Berliner Jahrbuch, the Catalogues of Newcomb, Safford, the Coast Survey, and the various Greenwich lists.

The following notation was adopted: Let

$\varphi =$ the latitude of the station;

δ_n and $\delta_s =$ the apparent declinations of the northern and southern stars;

z_n and $z_s =$ the zenith distances of the northern and southern stars;

$z_0 =$ the zenith distance corresponding to the zero reading of the micrometer;

M_n and $M_s =$ the micrometer readings for northern and southern stars expressed in revolutions of the micrometer;

m_n and $m_s =$ the micrometer readings for northern and southern stars expressed in seconds of arc;

m'_n and $m'_s =$ the micrometer readings for northern and southern stars expressed in minutes of arc;

L_n and $L_s =$ the state of the level for northern and southern stars expressed in divisions of the level;

l_n and $l_s =$ the state of the level for northern and southern stars expressed in seconds of arc; and

r_n and $r_s =$ the value of the mean refraction for z_n and z_s.

In Talcott's method either of two cases may occur.

Case I. When the circle is east for the northern star and west for the southern star, the micrometer reading increases as the zenith distance increases.

Case II. When the circle is east for the southern star and west for the northern star, the micrometer reading increases as the zenith distance decreases.

Hence in case I,

$$\begin{aligned} z_n &= z_o + m_n + l_n + r_n \\ z_s &= z_o + m_s + l_s + r_s \\ z_n - z_s &= (m_n - m_s) + (l_n - l_s) + (r_n - r_s) \end{aligned}$$

and in Case II,

$$\begin{aligned} z_n &= z_o - m_n - l_n - r_n \\ z_s &= z_o - m_s - l_s - r_s \\ z_n - z_s &= -(m_n - m_s) - (l_n - l_s) - (r_n - r_s) \end{aligned}$$

Since $\varphi = \delta_s + z_s$ and also $\varphi = \delta_n - z_n$, we have

$$\varphi = \tfrac{1}{2}(\delta_n + \delta_s) + \tfrac{1}{2}(z_n - z_s)$$

and in Case I,

$$\varphi = \tfrac{1}{2}(\delta_n + \delta_s) + \tfrac{1}{2}(m_n - m_s) + \tfrac{1}{2}(l_n - l_s) + \tfrac{1}{2}(r_n - r_s),$$

while in Case II,

$$\varphi = \tfrac{1}{2}(\delta_n + \delta_s) - \tfrac{1}{2}(m_n - m_s) - \tfrac{1}{2}(l_n - l_s) - \tfrac{1}{2}(r_n - r_s).$$

$$\tfrac{1}{2}(m_n - \mathrm{m}_s) = \tfrac{1}{2}(\mathrm{M}_n - \mathrm{M}_s) \times \begin{cases} 68''.89 \text{ for Transit No. 1503.} \\ 69.36 \text{ for Transit No. 1504.} \end{cases}$$

Denoting the readings of the north and south ends of the bubble by N and S and N′ and S,′ the inclinations observed at the time of the observations of the north and south stars, respectively, will be

$$\mathrm{L}_n = \frac{\mathrm{N+S}}{2} \text{ and } \mathrm{L}_s = \frac{\mathrm{N'+S'}}{2}$$

Hence,

$$\tfrac{1}{2}(l_n - l_s) = \frac{(\mathrm{N+S}) - (\mathrm{N'+S'})}{4} \times \begin{cases} 1''.23 \text{ for Transit No. 1503.} \\ 1.35 \text{ for Transit No. 1504.} \\ 1.14 \text{ for Transit No. 1504 with tube of striding level.} \end{cases}$$

$$\tfrac{1}{2}(r_n - r_s) = \tfrac{1}{2}(m'_n - m'_s) \times \begin{cases} 0''.0167 \text{ for } z = 0^\circ \\ 0.0200 \text{ for } z = 20^\circ \\ 0.0225 \text{ for } z = 30^\circ \end{cases}$$

These values for differential refraction were taken from Bessel's tables. The stars were all observed on the meridian or so nearly so as to need no correction for reduction to the meridian.

TIME OBSERVATIONS.

TIME OBSERVATIONS.

In the tables of time observations the columns "Azimuth" and "Aberration and collimation" give the corrections derived from the final values of a and c. The preliminary values of a and c and ΔT, the normal equations, the derived corrections, and the final values of a and c, with the final clock correction at the epoch of reduction, and the hourly rate, are given below each table. In the column "Chronometer correction," the corrections derived from circumpolar stars are inclosed in brackets, as they do not enter into the final chronometer correction.

Transits of stars observed at Coatzacoalcos, Mexico, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1888.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 29	α Arietis	W.	7	2 49 31.436	—0.441	—0.119	+0.055	—0.267	—0.064	30.600	2 0 54.566	—0 48 36.034	—0.055
	55 Cassiop. . . .	.	7	2 54 23.150	—0.520	—0.186	+1.110	—0.605	—0.059	22.890	2 5 47.008	[35.882]	. . .
	ξ¹ Ceti	.	7	2 55 43.501	—0.314	—0.114	—0.105	—0.249	—0.057	42.662	2 7 6.586	36.076	—0.013
	θ Arietis		7	3 0 33.546	—0.334	—0.121	+0.014	—0.261	—0.051	32.793	2 11 56.689	36.104	+0.015
	ι Cassiop.		7	3 8 32.300	—0.530	—0.185	+1.167	—0.627	—0.042	32.083	2 19 55.816	[36.267]	. .
	ξ² Ceti	.	7	3 10 51.957	—0.313	—0.107	—0.109	—0.248	—0.039	51.141	2 22 15.107	36.034	—0.055
	ν Arietis	.	7	3 21 7.269	—0.338	—0.090	+0.038	—0.264	—0.027	6.588	2 32 30.529	36.059	—0.030
	δ Ceti		7	3 22 24.253	—0.299	—0.076	—0.191	—0.246	—0.026	23.415	2 33 47.320	36.095	+0.006
	Br. 366		7	3 23 53.900	—0.534	—0.129	+1.197	—0.639	—0.024	53.771	2 35 17.643	[36.128]	. . .
	35 Arietis		7	3 25 32.736	—0.350	—0.078	+0.108	—0.277	—0.022	32.117	2 36 56.050	36.067	—0.022
	μ Ceti	.	7	3 27 33.104	—0.316	—0.060	—0.091	—0.249	—0.020	32.368	2 38 56.184	36.184	+0.095
	41 Arietis	W.	7	3 32 3.531	—0.349	—0.042	+0.102	—0.276	—0.014	2.952	2 43 26.810	—0 48 36.142	+0.053
	α Ceti .	E.	7	3 45 4.286	+0.306	—0.240	—0.126	+0.206	+0.001	4.433	2 56 28.429	—0 48 36.004	—0.085
	δ Arietis	.	7	3 53 52.530	+0.334	—0.273	+0.011	+0.218	+0.012	52.832	3 5 16.767	36.065	—0.024
	ζ Arietis		7	3 57 6.944	+0.336	—0.281	+0.023	+0.220	+0.015	7.257	3 8 31.170	36.087	—0.002
	ο Tauri		7	4 7 26.189	+0.314	—0.292	—0.084	+0.208	+0.028	26.363	3 18 50.310	36.053	—0.036
	ξ Tauri . . .	.	7	4 9 45.093	+0.315	—0.300	—0.078	+0.209	+0.030	45.269	3 21 9.120	36.149	+0.060
	f Tauri	.	7	4 13 20.573	+0.321	—0.320	—0.050	+0.211	+0.035	20.770	3 24 44.605	36.165	+0.076
	ε Eridani		7	4 16 18.227	+0.282	—0.293	—0.240	+0.209	+0.038	18.223	3 27 42.049	36.174	+0.085
	Groom. 716 . . .	.	7	4 21 7.307	+0.491	—0.549	+0.777	+0.452	+0.044	8.522	3 32 32.402	[36.120]	. . .
	δ Eridani		7	4 26 31.959	+0.282	—0.345	—0.243	+0.209	+0.050	31.912	3 37 55.888	36.024	—0.065
	η Tauri		7	4 29 29.010	+0.342	—0.442	+0.054	+0.225	+0.054	29.243	3 40 53.179	36.064	—0.025
	27 Tauri		7	4 31 9.614	+0.342	—0.456	+0.053	+0.225	+0.056	9.834	3 42 33.729	36.105	+0.016
	9 H. Camelop. . .	E.	7	4 36 16.357	+0.475	—0.694	+0.699	+0.422	+0.062	17.321	3 47 41.264	—0 48[36.057]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = -0.590 + da' \text{ circle W.} & \left\{\begin{array}{l} 0 = +0.095 + 3.180\,da' \qquad\qquad + 3.654\,dc - 1.243\,dt \\ \quad +0.084 \qquad\qquad + 2.163\,da'' - 0.906\,dc + 0.287\,dt \\ \quad +0.262 + 3.654\,da' - 0.906\,da'' + 29.327\,dc + 0.382\,dt \\ \quad -0.081 - 1.243\,da' + 0.287\,da'' + 0.382\,dc + 20.538\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = -0.019 \\ da'' = -0.042 \\ dc = -0.008 \\ dt = +0.004 \end{array} \\
& a'' = -0.462 + da'' \text{ " E.} & & \\
& c = +0.234 + dc \text{ " E.} & & \\
& \triangle T = -0^h\,48^m\,36^s.092 + dt. & &
\end{array}
$$

$a' = -0^s.609$ (circle west); $a'' = -0^s.504$ (circle east); $c = 0^s.226$ (+ with circle east.)

Chronometer No. 1295, at $3^h\,44^m.0$ chron. time, $0^h\,48^m\,36^s.089 \pm 0^s.008$ fast, losing $0^s.071$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 30	η Tauri	W.	7	4 29 27.890	—0.342	+0.207	+0.054	—0.242	—0.048	27.519	3 40 53.180	—0 48 34.339	+0.056
	9 H. Camelop. . .		7	4 36 15.536	—0.475	+0.290	+0.700	—0.455	—0.040	15.556	3 47 41.248	[34.308]	. . .
	λ Tauri	.	7	4 43 6.489	—0.321	+0.197	—0.054	—0.227	—0.032	6.052	3 54 31.868	34.184	—0.099
	ν Tauri	.	7	4 45 49.914	—0.309	+0.190	—0.110	—0.223	—0.029	49.433	3 57 15.168	34.265	—0.018
	A¹ Tauri	.	7	4 46 42.600	—0.339	+0.209	+0.034	—0.239	—0.028	42.237	3 58 8.080	34.157	—0.126
	Groom. 750 . . .		7	4 50 37.143	—1.484	+0.919	+5.634	—2.689	—0.023	39.500	4 2 5.227	[34.273]	. . .
	γ Tauri		7	5 2 3.503	—0.326	+0.204	—0.026	—0.230	—0.011	3.114	4 13 28.710	34.404	+0.121
	δ Tauri	W.	7	5 5 6.826	—0.330	+0.207	—0.008	—0.232	—0.007	6.456	4 16 32.112	—0 48 34.344	+0.061
	β Eridani . . .	E.	7	5 50 57.917	+0.290	—0.020	—0.198	+0.183	+0.046	58.218	5 2 23.900	—0 48 34.318	+0.035
	β Orionis . . .		7	5 57 46.503	+0.285	—0.033	—0.223	+0.184	+0.053	46.769	5 9 12.560	34.209	—0.074
	τ Orionis . . .	.	7	6 0 47.346	+0.287	—0.038	—0.211	+0.183	+0.057	47.624	5 12 13.300	34.324	+0.041
	Groom. 966 . . .	E.	2	6 13 27.575	+0.664	—0.143	+1.597	+0.702	+0.072	30.467	5 24 56.200	—0 48[34.267]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = -0.511 + da' \text{ circle W.} & \left\{\begin{array}{l} 0 = -0.017 + 2.559\,da' \qquad\qquad + 2.993\,dc - 0.474\,dt \\ \quad +0.070 \qquad\qquad + 1.283\,da'' + 0.404\,dc + 1.048\,dt \\ \quad +0.013 + 2.993\,da' + 0.404\,da'' + 14.345\,dc - 3.942\,dt \\ \quad -0.004 - 0.474\,da' + 1.048\,da'' - 3.942\,dc + 9.469\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = +0.006 \\ da'' = -0.061 \\ dc = +0.002 \\ dt = +0.008 \end{array} \\
& a'' = -0.434 + da'' \text{ " E.} & & \\
& c = +0.200 + dc \text{ " E.} & & \\
& \triangle T = -0^h\,48^m\,34^s.292 + dt. & &
\end{array}
$$

$a' = -0^s.505$ (circle west); $a'' = -0^s.495$ (circle east); $c = 0^s.202$ (+ with circle east).

Chronometer No. 1295, at $5^h\,11^m.3$ chron. time, $0^h\,48^m\,34^s.283 \pm 0^s.019$ fast, losing $0^s.069$ per hour.

Transits of stars observed at Coatzacoalcos, Mexico, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 7	δ Ceti	E.	7	3 22 8.736	+0.299	+0.137	−0.089	+0.211	−0.068	9.226	2 33 47.222	−0 48 22.004	+0.112
	μ Ceti		7	3 27 17.629	+0.316	+0.107	−0.043	+0.214	−0.062	18.161	2 38 56.089	22.072	+0.180
	η Eridani		7	3 39 21.593	+0.283	+0.024	−0.133	+0.214	−0.050	21.931	2 51 0.020	21.911	+0.019
	ε Arietis		7	3 41 12.926	+0.337	+0.018	+0.015	+0.226	−0.048	13.474	2 52 51.652	21.822	−0.070
	α Ceti		6	3 44 49.839	+0.306	0.000	−0.071	+0.211	−0.044	50.241	2 56 28.350	21.891	−0.001
	α Persei		7	4 4 44.919	+0.414	−0.053	+0.228	+0.325	−0.024	45.809	3 16 24.104	[21.705]	. . .
	ο Tauri		7	4 7 11.579	+0.314	−0.043	−0.048	+0.213	−0.021	11.994	3 18 50.244	21.750	−0.142
	ξ Tauri		7	4 9 30.421	+0.315	−0.046	−0.044	+0.214	−0.019	30.841	3 21 9.072	21.771	−0.121
	γ Camelop. II.	E.	7	4 27 0.457	+0.584	−0.148	+0.697	+0.648	−0.001	2.237	3 38 40.076	−0 48 [22.161]	.
	λ Tauri	W.	7	4 42 54.161	−0.321	+0.086	−0.032	−0.257	+0.016	53.653	3 54 31.829	−0 48 21.824	−0.068
	ν Tauri		7	4 45 37.453	−0.309	+0.091	−0.065	−0.252	+0.018	36.936	3 57 15.119	21.817	−0.075
	ο¹ Eridani		7	4 54 49.297	−0.287	+0.109	−0.129	−0.253	+0.028	48.765	4 6 26.944	21.821	−0.071
	γ Tauri		7	5 1 50.944	−0.326	+0.143	−0.015	−0.260	+0.035	50.521	4 13 28.681	21.840	−0.052
	δ Tauri		7	5 4 54.360	−0.330	+0.151	−0.005	−0.263	+0.038	53.951	4 16 32.095	21.856	−0.036
	α Tauri		7	5 17 55.621	−0.328	+0.175	−0.010	−0.262	+0.052	55.248	4 29 33.219	22.029	+0.137
	Groom. 848		7	5 28 18.807	−0.685	+0.379	+1.024	−1.019	+0.056	18.562	4 33 56.838	[21.724]	.
	τ Tauri		7	5 23 57.481	−0.341	+0.190	+0.026	−0.272	+0.058	57.142	4 35 35.138	22.004	+0.112
	ω Camelop.		7	5 31 24.357	−0.843	+0.492	+0.550	−0.621	+0.066	24.001	4 43 2.102	[21.899]	. . .
	ι Tauri	W.	7	5 33 15.330	−0.332	+0.196	+0.003	−0.265	+0.068	15.000	4 44 53.036	−0 48 21.964	+0.072

NORMAL EQUATIONS.

Assuming
$a' = -0^s.437 + da'$ circle E.
$a'' = -0.327 + da''$ " W.
$c = +0.259 + dc$ " E.
$\triangle T = -0^h\,48^m\,21^s.873 + dt.$

$$\left\{\begin{array}{l} 0 = -0.313 + 1.979\,da' \qquad\qquad - 0.705\,dc + 0.510\,dt \\ \quad -0.016 \qquad\qquad + 2.554\,da'' + 2.117\,dc - 0.153\,dt \\ \quad +0.662 - 0.705\,da' + 2.117\,da'' + 22.689\,dc - 0.840\,dt \\ \quad +0.130 + 0.510\,da' - 0.153\,da'' - 0.840\,dc + 16.181\,dt \end{array}\right\}$$

whence $da' = +0^s.152$, $da'' = +0.028$, $dc = -0.028$, $dt = -0.014$

$a' = -0^s.285$ (circle east); $a'' = -0^s.299$ (circle west); $c = 0^s.231$ (+ with circle east).

Chronometer No. 1295, at $4^h\,27^m.8$ chron. time, $0^h\,48^m\,21^s.892 \pm 0^s.017$ fast, losing $0^s.062$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 12	ν Piscium	W.	7	2 23 53.924	−0.308	−0.033	−0.011	−0.323	−0.041	53.208	1 35 38.526	−0 48 14.682	+0.032
	υ Piscium		7	2 27 46.594	−0.314	−0.040	−0.008	−0.326	−0.037	45.869	1 39 31.201	14.668	+0.018
	ε Cassiop.		7	2 34 40.364	−0.492	−0.077	+0.072	−0.712	−0.030	39.125	1 46 24.391	[14.734]	
	β Arietis		7	2 36 45.271	−0.335	−0.054	+0.002	−0.343	−0.028	44.513	1 48 29.823	14.690	+0.040
	50 Cassiop.		7	2 42 13.900	−0.598	−0.112	+0.119	−1.036	−0.022	12.251	1 53 57.683	[14.568]	. .
	α Arietis		7	2 49 9.780	−0.341	−0.074	+0.004	−0.350	−0.015	9.004	2 0 54.389	14.615	−0.035
	ξ¹ Ceti	W.	7	2 55 21.803	−0.314	−0.076	−0.008	−0.326	−0.008	21.071	2 7 6.436	−0 48 14.635	−0.015
	ι Cassiop.	E.	7	3 8 9.300	+0.530	−0.440	−0.238	+0.719	+0.004	9.875	2 19 55.261	−0 48 [14.614]	.
	ξ² Ceti		7	3 10 29.281	+0.313	−0.271	+0.022	+0.285	+0.007	29.637	2 22 14.961	14.676	+0.026
	36 H. Cassiop.		7	3 15 43.450	+0.607	−0.576	−0.331	+0.929	+0.012	44.091	2 27 29.838	[14.253]	.
	ν Arietis		7	3 20 44.693	+0.338	−0.348	−0.008	+0.303	+0.017	44.995	2 32 30.372	14.623	−0.027
	Br. 366		7	3 23 31.179	+0.534	−0.573	−0.244	+0.732	+0.020	31.648	2 35 17.115	[14.533]	
	35 Arietis		7	3 25 10.210	+0.350	−0.384	−0.022	+0.317	+0.022	10.493	2 36 55.902	14.591	−0.059
	μ Ceti		7	3 27 10.469	+0.316	−0.358	+0.019	+0.286	+0.024	10.756	2 38 56.034	14.722	+0.072
	41 Arietis		7	3 31 41.014	+0.349	−0.420	−0.021	+0.316	+0.028	41.266	2 43 26.650	14.616	−0.034
	σ Arietis	E.	7	3 33 35.881	+0.325	−0.401	+0.008	+0.291	+0.030	36.134	2 45 21.498	−0 48 14.636	−0.014

NORMAL EQUATIONS.

Assuming
$a' = -0^s.015 + da'$ circle W.
$a'' = +0.075 + da''$ " E.
$c = +0.336 + dc$ " E.
$\triangle T = -0^h\,48^m\,14^s.656 + dt.$

$$\left\{\begin{array}{l} 0 = +0.147 + 2.134\,da' \qquad\qquad + 2.207\,dc - 0.546\,dt \\ \quad -0.004 \qquad\qquad + 3.306\,da'' + 4.166\,dc - 1.486\,dt \\ \quad +0.544 + 2.207\,da' + 4.166\,da'' + 20.954\,dc + 1.788\,dt \\ \quad -0.044 - 0.546\,da' - 1.486\,da'' + 1.788\,dc + 12.210\,dt \end{array}\right\}$$

whence $da' = -0^s.031$, $da'' = +0.049$, $dc = -0.034$, $dt = +0.013$

$a' = -0^s.046$ (circle west); $a'' = +0^s.124$ (circle east); $c = 0^s.302$ (+ with circle E.).

Chronometer No. 1295, at $3^h\,3^m.8$ chron. time, $0^h\,48^m\,14^s.650 \pm 0^s.008$ fast, losing $0^s.061$ per hour.

Transits of stars observed at Coatzacoalcos, Mexico, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	ν.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	
Jan. 14	α Eridani	W.	7	2 21 45.500	−0.144	+0.004	+0.566	−0.723	−0.079	45.124	1 33 33.534	−0 48[11.590]	. . .
	ν Piscium	.	7	2 23 50.584	−0.308	+0.009	+0.072	−0.387	−0.076	49.894	1 35 38.502	11.392	−0.030
	ο Piscium		7	2 27 43.256	−0.314	+0.010	+0.052	−0.390	−0.071	42.543	1 39 31.175	11.368	−0.054
	α Arietis		7	2 49 6.601	−0.341	+0.023	−0.028	−0.418	−0.043	5.791	2 0 54.361	11.433	+0.011
	55 Cassiop.	.	7	2 53 59.771	−0.520	+0.038	−0.567	−0.947	−0.036	57.739	2 5 46.369	[11.370]	. . .
	θ Arietis		7	3 0 8.713	−0.334	+0.029	−0.007	−0.408	−0.028	7.965	2 11 56.514	11.451	+0.029
	ι Cassiop.	.	7	3 8 8.921	−0.530	+0.050	−0.596	−0.981	−0.017	6.847	2 19 55.174	[11.673]	. . .
	ξ^2 Ceti	.	7	3 10 26.900	−0.313	+0.032	+0.056	−0.389	−0.014	26.272	2 22 14.935	11.337	−0.085
	ν Arietis	W.	7	3 20 42.490	−0.338	+0.041	−0.019	−0.414	−0.001	41.759	2 32 30.346	−0 48 11.413	−0.009
	41 Arietis	E.	7	3 31 37.564	+0.349	−0.194	−0.072	+0.386	+0.014	38.047	2 43 26.622	−0 48 11.425	+0.003
	σ Arietis		7	3 33 32.391	+0.325	−0.187	+0.027	+0.356	+0.016	32.928	2 45 21.470	11.458	+0.036
	47 Cephei, H.		7	3 39 33.757	+0.803	−0.497	−1.969	+1.805	+0.025	33.924	2 51 22.359	[11.565]	. .
	α Ceti	.	7	3 44 39.170	+0.306	−0.202	+0.108	+0.346	+0.031	39.759	2 56 28.279	11.480	+0.058
	48 Cephei, H.	.	7	3 54 28.164	+0.735	−0.541	−1.688	+1.573	+0.044	28.287	3 6 16.516	[11.771]	. . .
	ζ Arietis		7	3 56 41.966	+0.336	−0.253	−0.019	+0.368	+0.047	42.445	3 8 31.012	11.433	+0.011
	ο Tauri	.	7	4 7 1.067	+0.314	−0.260	+0.072	+0.349	+0.061	1.603	3 18 50.176	11.427	+0.005
	ξ Tauri		7	4 9 19.923	+0.315	−0.266	+0.067	+0.349	+0.064	20.452	3 21 9.008	11.444	+0.022
	Groom. 716	E.	7	4 20 42.986	+0.491	−0.455	−0.664	+0.756	+0.079	43.193	3 32 32.042	−0 48[11.151]	. . .

NORMAL EQUATIONS.

$$\begin{array}{llll}
\text{Assuming} & a' = +0^s.303 + da' \text{ circle W.} & 0 = -0.027 + 3.519\,da' \qquad\qquad + 0.671\,dc + 0.179\,dt & \text{whence } da' = +0^s.008 \\
 & a'' = +0.446 + da'' \quad \text{“ E.} & \quad +0.058 \qquad + 3.871\,da'' - 4.111\,dc - 0.795\,dt & da'' = -0.015 \\
 & c = +0.364 + dc \quad \text{“ E.} & \quad -0.100 + 0.671\,da' - 4.111\,da'' + 23.563\,dc - 0.664\,dt & dc = +0.001 \\
 & \triangle T = -0^h 48^m 11^s.422 + dt. & \quad +0.056 + 0.179\,da' - 0.795\,da'' - 0.664\,dc + 13.501\,dt & dt = -0.005
\end{array}$$

$a' = +0^s.311$ (circle west); $a'' = +0^s.431$ (circle east); $c = 0^s.365$ (+ with circle east).

Chronometer No. 1295 at $3^h\,21^m.2$ chron. time, $0^h\,48^m\,11^s.422 \pm 0^s.008$ fast, losing $0^s.080$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	ν.
Jan. 15	α Eridani	E.	7	2 21 43.040	+0.144	−0.066	+0.106	+0.141	−0.095	43.270	1 33 33.502	−0 48 [9.768]	. . .
	ο Piscium	.	7	2 27 40.371	+0.314	−0.161	+0.010	+0.076	−0.086	40.524	1 39 31.162	9.362	+0.046
	ζ Ceti	.	7	2 34 7.396	+0.280	−0.159	+0.029	+0.076	−0.076	7.546	1 45 58.132	9.414	+0.098
	50 Cassiop.		7	2 42 6.666	+0.598	−0.380	−0.150	+0.241	−0.063	6.912	1 53 57.504	[9.408]	. . .
	α Arietis	.	7	2 49 3.496	+0.341	−0.229	−0.005	+0.081	−0.052	3.632	2 0 54.347	9.285	−0.031
	55 Cassiop.	.	7	2 53 55.607	+0.520	−0.368	−0.106	+0.188	−0.045	55.796	2 5 46.326	[9.470]	. . .
	67 Ceti	.	7	2 59 35.246	+0.287	−0.212	+0.025	+0.076	−0.036	35.386	2 11 26.183	9.203	−0.113
	ι Cassiop.		7	3 8 4.671	+0.530	−0.417	−0.111	+0.191	−0.023	4.841	2 19 55.130	[9.711]	. .
	ξ^2 Ceti		7	3 10 24.026	+0.313	−0.248	+0.010	+0.076	−0.019	24.158	2 22 14.922	9.236	−0.080
	ν Arietis		7	3 20 39.399	+0.338	−0.284	−0.004	+0.081	−0.003	39.527	2 32 30.334	9.193	−0.123
	δ Ceti	.	7	3 21 56.211	+0.299	−0.253	+0.018	+0.075	−0.001	56.349	2 33 47.139	9.210	−0.106
	35 Arietis	E.	7	3 25 5.030	+0.349	−0.300	−0.010	+0.084	+0.004	5.157	2 36 55.862	−0 48 9.295	−0.021
	41 Arietis	W.	7	3 31 36.541	−0.349	−0.004	−0.013	−0.129	+0.014	36.060	2 43 26.608	−0 48 9.452	+0.136
	σ Arietis		7	3 33 31.257	−0.325	−0.004	+0.005	−0.119	+0.017	30.831	2 45 21.456	9.375	+0.059
	47 Cephei, H.	.	7	3 39 33.186	−0.803	−0.007	−0.343	−0.602	+0.027	31.458	2 51 22.265	[9.193]	. . .
	α Ceti	.	7	3 44 37.950	−0.306	−0.002	+0.019	−0.115	+0.035	37.581	2 56 28.268	9.313	−0.003
	48 Cephei, H.	.	7	3 54 27.229	−0.735	0.000	−0.294	−0.524	+0.050	25.726	3 6 16.440	[9.286]	. . .
	ζ Arietis		7	3 56 40.707	−0.236	0.000	−0.003	−0.123	+0.054	40.399	3 8 31.000	9.399	+0.083
	ο Tauri		7	4 6 59.797	−0.314	0.000	+0.013	−0.116	+0.070	59.450	3 18 50.165	9.285	−0.031
	f Tauri		7	4 12 54.220	−0.321	0.000	+0.007	−0.118	+0.079	53.867	3 24 44.459	9.408	+0.092
	Groom. 716	W.	7	4 20 42.193	−0.491	0.000	−0.116	−0.252	+0.091	41.425	3 32 32.013	−0 48 [9.412]	. . .

NORMAL EQUATIONS.

$$\begin{array}{llll}
\text{Assuming} & a' = +0^s.108 + da' \text{ circle E.} & 0 = +0.190 + 5.203\,da' \qquad\qquad - 1.297\,dc + 0.574\,dt & \text{whence } da' = -0^s.050 \\
 & a'' = +0.127 + da'' \quad \text{“ W.} & \quad +0.435 \qquad + 3.857\,da'' + 4.167\,dc - 0.851\,dt & da'' = -0.052 \\
 & c = +0.152 + dc \quad \text{“ E.} & \quad +1.723 - 1.297\,da' + 4.167\,da'' + 27.592\,dc + 3.304\,dt & dc = -0.057 \\
 & \triangle T = -0^h 48^m 9^s.339 + dt & \quad +0.201 + 0.574\,da' - 0.851\,da'' + 3.304\,dc + 15.677\,dt & dt = -0.002
\end{array}$$

$a' = +0^s.058$ (circle east); $a'' = +0^s.075$ (circle west); $c = 0^s.095$ (+ with circle east).

Chronometer No. 1295 at $3^h\,22^m.5$ chron. time, $0^h\,48^m\,9^s.316 \pm 0^s.016$ fast, losing $0^s.094$ per hour.

Transits of stars observed at Coatzacoalcos, Mexico, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer corrections.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 10	ν Piscium	W.	7	2 23 46.130	−0.308	−0.025	+0.028	−0.184	−0.067	45.574	1 35 38.478	−0 48 7.096	+0.038
	o Piscium .	.	7	2 27 38.743	−0.314	−0.030	+0.020	−0.185	−0.061	38.173	1 39 31.149	7.024	−0.034
	ε Cassiop. . .	.	7	2 34 32.707	−0.492	−0.053	−0.191	−0.405	−0.051	31.515	1 46 24.236	[7.279]	. .
	β Arietis . . .		7	2 36 37.509	−0.335	−0.038	−0.005	−0.195	−0.048	36.888	1 48 29.771	7.117	+0.059
	50 Cassiop. . .	.	7	2 42 5.921	−0.598	−0.076	−0.316	−0.589	−0.039	4.303	1 53 57.382	[6.921]	. . .
	α Arietis		7	2 49 2.004	−0.341	−0.048	−0.011	−0.199	−0.029	1.376	2 0 54.333	7.043	−0.015
	ξ¹ Ceti	.	7	2 55 13.949	−0.314	−0.049	+0.021	−0.185	−0.019	3.403	2 7 6.388	7.015	−0.043
	θ Arietis		7	3 0 4.143	−0.334	−0.056	−0.003	−0.194	−0.012	3.544	2 11 56.488	7.056	−0.002
	ι Cassiop. . . .	W.	7	3 8 3.357	−0.530	−0.097	−0.234	−0.466	0.000	2.030	2 19 55.085	−0 48 [6.945]	. .
	36 H. Cassiop. . .	E.	7	3 15 36.493	+0.607	−0.403	−0.470	+0.471	+0.012	36.710	2 27 29.603	−0 48 [7.107]	. .
	ν Arietis . . .		7	3 20 37.117	+0.338	−0.238	−0.011	+0.154	+0.019	37.379	2 32 30.320	7.059	+0.001
	Br. 366 . . .		7	3 23 23.643	+0.534	−0.390	−0.346	+0.371	+0.023	23.835	2 35 16.947	[6.888]	.
	35 Arietis . . .		7	3 25 2.643	+0.350	−0.260	−0.031	+0.161	+0.026	2.889	2 36 55.848	7.041	−0.017
	μ Ceti		7	3 27 2.866	+0.316	−0.240	+0.026	+0.145	+0.029	3.142	2 38 55.987	7.155	+0.097
	41 Arietis . . .		7	3 31 33.401	+0.349	−0.274	−0.030	+0.160	+0.036	33.642	2 43 26.594	7.048	−0.010
	47 Cephei, H. . .		7	3 39 29.214	+0.803	−0.662	−0.804	+0.748	+0.048	29.347	2 51 22.171	[7.176]	. . .
	α Ceti . .		7	3 44 35.011	+0.306	−0.255	+0.044	+0.143	+0.056	35.304	2 56 28.256	7.048	−0.010
	δ Arietis	E.	7	3 53 23.306	+0.344	−0.282	−0.004	+0.152	+0.069	23.585	3 5 16.587	−0 48 6.998	−0.060

NORMAL EQUATIONS.

Assuming
$a' = +0^s.129 + da'$ circle W.
$a'' = +0.191 + da''$ " E.
$c = +0.179 + dc$ " E.
$\triangle T = -0^h\,48^m\,7^s.059 + dt.$

$$\left\{\begin{array}{l} 0 = +0.075 + 3.116\,da' + 3.536\,dc - 1.081\,dt \\ \quad -0.014 + 3.833\,da'' - 4.576\,dc - 1.311\,dt \\ \quad +0.330 + 3.536\,da' - 4.576\,da'' + 24.063\,dc - 0.244\,dt \\ \quad -0.028 - 1.081\,da' - 1.311\,da'' - 0.244\,dc + 13.281\,dt \end{array}\right\}$$

whence
$da' = -0^s.007$
$da'' = -0.015$
$dc = -0.016$
$dt = 0.000$

$a' = +0^s.122$ (circle west); $a'' = +0^s.176$ (circle east); $c = 0^s.163$ (+ with circle east).

Chronometer No. 1295, at $3^h\,7^m.9$ chron. time, $0^h\,48^m\,7^s.058 \pm 0^s.009$ fast, losing $0^s.091$ per hour.

Date.	Name of star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer corrections.	v.
Jan. 17	ε Cassiop. . . .	E.	7	2 34 29.150	+0.492	−0.469	−0.516	+0.480	−0.053	29.084	1 46 24.196	−0 48 [4.888]	. . .
	β Arietis . . .		7	2 36 34.683	+0.335	−0.321	−0.013	+0.231	−0.050	34.865	1 48 29.758	5.107	+0.020
	50 Cassiop.		7	2 42 2.893	+0.598	−0.585	−0.855	+0.698	−0.044	2.705	1 53 57.382	[5.323]	. . .
	α Arietis		7	2 48 59.169	+0.441	−0.345	−0.030	+0.236	−0.035	59.436	2 0 54.319	5.117	+0.030
	ξ¹ Ceti		7	2 55 11.134	+0.314	−0.331	+0.057	+0.219	−0.028	11.365	2 7 6.376	4.989	−0.098
	67 Ceti	E.	7	2 59 30.981	+0.287	−0.312	+0.141	+0.219	−0.023	31.293	2 11 26.157	−0 48 5.136	+0.049
	36 H. Cassiop. .	W.	7	3 15 36.550	−0.607	−0.241	−0.182	−0.847	−0.003	34.670	2 27 29.543	−0 48 [5.127]	. . .
	ν Arietis . .	.	6	3 20 36.163	−0.338	−0.129	−0.004	−0.276	+0.002	35.418	2 32 30.307	5.111	+0.024
	Br. 366 .	.	7	3 23 23.464	−0.534	−0.197	−0.133	−0.667	+0.006	21.939	2 35 16.903	[5.036]	. .
	35 Arietis . . .		7	3 25 1.623	−0.350	−0.128	−0.012	−0.289	+0.008	0.852	2 36 55.834	5.018	−0.069
	π Ceti	.	6	3 26 55.587	−0.274	−0.099	+0.038	−0.265	+0.010	54.997	2 38 49.917	5.080	−0.007
	41 Arietis . . .		7	3 31 32.439	−0.349	−0.122	−0.011	−0.288	+0.016	31.685	2 43 26.580	5.105	+0.018
	ε Arietis .	.	7	3 40 57.314	−0.337	−0.107	−0.003	−0.275	+0.027	56.619	2 52 51.527	5.092	+0.005
	α Ceti		7	3 44 33.910	−0.306	−0.093	+0.017	−0.256	+0.031	33.303	2 56 28.244	5.059	−0.028
	δ Arietis . .	W.	7	3 53 22.380	−0.344	−0.092	−0.001	−0.272	+0.042	21.713	3 5 16.574	−0 48 5.139	+0.052

NORMAL EQUATIONS.

Assuming
$a' = +0^s.439 + da'$ circle E.
$a'' = +0.149 + da''$ " W.
$c = +0.251 + dc$ " E.
$\triangle T = -0^h\,48^m\,5^s.089 + dt.$

$$\left\{\begin{array}{l} 0 = +0.215 + 2.235\,da' - 2.178\,dc - 0.517\,dt \\ \quad +0.252 + 2.639\,da'' + 2.514\,dc - 0.634\,dt \\ \quad +0.256 - 2.178\,da' + 2.514\,da'' + 19.424\,dc - 3.223\,dt \\ \quad -0.219 - 0.517\,da' + 0.634\,da'' - 3.223\,dc + 11.943\,dt \end{array}\right\}$$

whence
$da' = -0^s.109$
$da'' = -0.081$
$dc = -0.014$
$dt = +0.010$

$a' = +0^s.330$ (circle east); $a'' = +0^s.068$ (circle west); $c = 0^s.237$ (+ with circle east.).

Chronometer No. 1295, at $3^h\,18^m.5$, chron. time, $0^h\,48^m\,5^s.087 \pm 0^s.011$ fast, losing $0^s.072$ per hour.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Feb. 9	Br. 1147	E.	7	8 59 35.021	+0.657	—0.217	—0.274	+1.598	—0.154	36.631	8 5 38.054	—0 53 [58.577]	. . .
	20 Navis	.	7	9 2 12.280	+0.278	—0.087	+0.041	+0.399	—0.149	12.762	8 8 14.649	58.113	+0.010
	β Cancri		7	9 4 27.933	+0.317	—0.095	+0.009	+0.389	—0.142	28.411	8 10 30.350	58.061	—0.0[illegible]2
	Cordova, 1649 .		7	9 11 5.657	+0.112	—0.028	+0.180	+0.918	—0.118	6.721	8 17 8.292	[58.429]	. . .
	30 Monocerotis . .		7	9 14 5.154	+0.297	—0.071	+0.026	+0.385	—0.112	5.679	8 20 7.522	58.157	+0.054
	η Cancri . . .		7	9 20 15.549	+0.336	—0.066	—0.007	+0.411	—0.092	16.131	8 26 18.073	58.058	—0.045
	σ Hydræ . . .		7	9 26 55.491	+0.308	—0.047	+0.016	+0.385	—0.072	56.081	8 32 58.123	57.958	—0.145
	δ Cancri . . .	.	7	9 32 20.769	+0.332	—0.040	—0.003	+0.405	—0.055	21.408	8 38 23.260	58.148	+0.045
	ε Hydræ . . .	E.	7	9 34 51.929	+0.313	—0.033	+0.012	+0.387	—0.047	52.561	8 40 54.562	—0 53 57.999	—0.104
	ζ Hydræ . . .	W.	7	9 43 30.891	—0.312	+0.169	—0.003	—0.427	—0.020	30.298	8 49 32.261	—0 53 58.037	—0.066
	σ^2 Ursæ Majoris .	.	7	9 54 38.200	—0.515	+0.411	+0.035	—1.112	+0.018	37.037	9 0 39.207	[57.830]	. . .
	θ Hydræ	.	7	10 2 34.651	—0.307	+0.290	—0.004	—0.424	+0.040	34.246	9 8 36.061	58.185	+0.082
	1 Draconis, H. . .	.	7	10 15 20.457	—0.912	+1.004	+0.109	—2.978	+0.083	17.763	9 21 19.133	[58.630]	. . .
	ο Leonis . . .	.	7	10 29 12.707	—0.319	+0.374	—0.002	—0.431	+0.124	12.453	9 35 14.258	58.195	+0.092
	ε Leonis	.	7	10 33 32.277	—0.342	+0.404	+0.003	—0.465	+0.137	32.014	9 39 33.719	58.295	+0.192
	π Leonis . . .	.	7	10 48 19.817	—0.316	+0.360	—0.002	—0.429	+0.183	19.613	9 54 21.536	58.077	—0.026
	η Leonis . . .	W.	7	10 55 15.866	—0.330	+0.358	0.000	—0.444	+0.205	15.655	10 1 17.593	—0 53 58.062	—0.041

NORMAL EQUATIONS.

Assuming

$$\left.\begin{aligned} a' &= +0^s.154 + da' \text{ circle E.} \\ a'' &= +0.112 + da'' \text{ “ W.} \\ c &= +0.452 + dc \text{ “ E.} \\ \triangle T &= -0^h 53^m 58^s.119 + dt. \end{aligned}\right. \quad \left\{\begin{aligned} 0 = &+0.329 + 3.592\,da' \qquad\qquad + 1.295\,dc + 1.533\,dt \\ &+0.498 \qquad\qquad + 2.839\,da'' + 2.714\,dc - 0.316\,dt \\ &+1.454 + 1.295\,da' + 2.714\,da'' + 21.074\,dc + 1.230\,dt \\ &+0.026 + 1.553\,da' - 0.316\,da'' + 1.230\,dc + 13.701\,dt \end{aligned}\right\} \quad \text{whence } \begin{aligned} da' &= -0^s.078 \\ da'' &= -0.129 \\ dc &= -0.048 \\ dt &= +0.008 \end{aligned}$$

$a' = +0^s.076$ (circle east); $a'' = -0^s.017$ (circle west); $c = 0^s.404$ (+ with circle east).

Chronometer No. 1295 at $9^h 48^m.8$ chron. time, $0^h 53^m 58^s.103 \pm 0^s.017$ fast, losing $0^s.188$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 10	δ Orionis . . .	W.	7	6 20 15.410	—0.302	—0.124	+0.140	—0.405	—0.114	14.605	5 26 20.254	—0 53 54.351	+0.086
	φ^1 Orionis	.	7	6 22 38.849	—0.317	—0.144	+0.059	—0.411	—0.107	37.929	5 28 43.666	54.263	—0.002
	ζ Tauri	.	7	6 24 55.986	—0.337	—0.166	—0.045	—0.434	—0.101	54.903	5 31 0.742	54.161	—0.104
	σ Orionis . .		7	6 27 5.631	—0.298	—0.158	+0.159	—0.405	—0.094	4.835	5 33 10.528	54.307	+0.042
	130 Tauri		7	6 34 53.229	—0.331	—0.193	—0.013	—0.425	—0.071	52.196	5 40 57.970	54.226	—0.039
	ζ Leporis . . .		7	6 35 50.880	—0.277	—0.162	+0.261	—0.418	—0.068	50.216	5 41 55.812	54.404	+0.139
	δ Doradus . . .	.	7	6 38 30.457	—0.107	—0.062	+1.187	—0.987	—0.060	30.428	5 44 36.460	[53.968]	. . .
	36 Camelop. . . .		7	6 55 38.529	—0.497	—0.156	—0.911	—0.986	—0.009	35.970	6 1 41.747	[54.223]	. . .
	22 H. Camelop. .	W.	7	7 0 34.821	—0.535	—0.076	—1.118	—1.149	+0.005	31.948	6 6 37.785	—0 53 [54.163]	. . .
	8 Monocerotis . .	E.	7	7 11 47.034	+0.310	—0.023	+0.050	+0.366	+0.039	47.776	6 17 53.516	—0 53 54.260	—0.005
	10 Monocerotis .		7	7 16 22.641	+0.295	—0.045	+0.087	+0.366	+0.052	23.396	6 22 29.066	54.330	+0.065
	23 H. Camelop.		7	7 21 13.314	+0.785	—0.172	—1.235	+2.039	+0.066	14.797	6 27 19.906	[54.891]	. . .
	γ Geminorum .		7	7 25 11.829	+0.329	—0.083	—0.001	+0.381	+0.078	12.533	6 31 18.323	54.210	—0.055
	ξ Geminorum . .		7	7 32 57.369	+0.322	—0.093	+0.014	+0.374	+0.101	58.087	6 39 3.939	54.148	—0.117
	43 Camelop. . . .		7	7 35 38.507	+0.531	—0.153	—0.549	+1.019	+0.109	39.464	6 41 45.463	[54.001]	. . .
	24 H. Camelop.		7	7 37 47.793	+0.685	—0.194	—0.968	+1.637	+0.116	49.069	6 43 54.828	[54.241]	. . .
	θ Canis Majoris		7	7 42 55.954	+0.284	—0.073	+0.119	+0.373	+0.131	56.788	6 49 2.487	54.301	+0.036
	ζ Geminorum . .	E.	7	7 51 25.420	+0.336	—0.056	—0.021	+0.390	+0.156	26.225	6 57 32.008	—0 53 54.217	—0.048

NORMAL EQUATIONS.

Assuming

$$\left.\begin{aligned} a' &= +0^s.381 + da' \text{ circle W.} \\ a'' &= +0.279 + da'' \text{ “ E.} \\ c &= +0.400 + dc \text{ “ E.} \\ \triangle T &= -0^h 53^m 54^s.257 + dt. \end{aligned}\right. \quad \left\{\begin{aligned} 0 = &-0.482 + 4.298\,da' \qquad\qquad - 0.120\,dc + 0.799\,dt \\ &+0.069 \qquad\qquad + 4.576\,da'' - 3.852\,dc - 0.197\,dt \\ &+0.361 - 0.120\,da' - 3.852\,da'' + 23.550\,dc - 0.618\,dt \\ &-0.145 + 0.799\,da' - 0.197\,da'' - 0.618\,dc + 13.184\,dt \end{aligned}\right\} \quad \text{whence } \begin{aligned} da' &= +0^s.111 \\ da'' &= -0.032 \\ dc &= -0.015 \\ dt &= +0.003 \end{aligned}$$

$a' = +0^s.492$ (circle west); $a'' = +0^s.247$ (circle east); $c = 0^s.385$ (+ with circle east).

Chronometer No. 1295 at $6^h 58^m.8$ chron. time, $0^h 53^m 54^s.265 \pm 0^s.015$ fast, losing $0^s.178$ per hour.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Feb. 11	π^5 Orionis	E.	7	5 42 17.570	+0.306	−0.070	−0.006	+0.435	−0.170	18.065	4 48 28.067	−0 53 49.998	−0.124
	10 Camelop.		7	5 47 21.779	+0.456	−0.103	+0.034	+0.877	−0.156	22.887	4 53 32.874	[50.013]	. . .
	ι Tauri	.	7	5 50 17.061	+0.337	−0.075	+0.002	+0.467	−0.148	17.644	4 56 27.545	50.099	−0.023
	11 Orionis		7	5 52 2.996	+0.326	−0.072	0.000	+0.451	−0.142	3.559	4 58 13.478	50.081	−0.041
	β Orionis		7	6 3 1.739	+0.290	−0.066	−0.010	+0.440	−0.112	2.281	5 9 12.238	50.043	−0.079
	δ Orionis		7	6 20 9.789	+0.302	−0.083	−0.007	+0.435	−0.063	10.373	5 26 20.240	50.133	+0.011
	φ^1 Orionis		7	6 22 33.234	+0.317	−0.092	−0.003	+0.441	−0.057	33.840	5 28 43.654	50.186	+0.064
	σ Orionis		7	6 27 0.097	+0.337	−0.106	−0.008	+0.466	−0.044	0.742	5 33 10.516	50.226	+0.104
	δ Doradus		7	6 38 25.621	+0.107	−0.043	−0.058	+1.060	−0.012	26.675	5 44 36.409	[50.266]	. . .
	36 Camelop.	E.	7	6 55 30.771	+0.497	−0.293	+0.044	+1.059	+0.036	32.114	6 1 41.717	−0 53 [50.397]	. . .
	22 H. Camelop.	W.	7	7 0 31.264	−0.535	+0.053	−1.195	−1.348	+0.050	28.289	6 6 37.746	−0 53 [50.543]	. . .
	μ Geminorum		7	7 10 5.824	−0.339	+0.070	−0.063	−0.514	+0.077	5.055	6 16 15.027	50.028	−0.094
	ν Geminorum		7	7 16 13.497	−0.335	+0.091	−0.040	−0.506	+0.094	12.801	6 22 22.637	50.164	+0.042
	23 H. Camelop.		7	7 21 15.721	−0.785	+0.259	−2.629	−2.653	+0.108	10.021	6 27 19.833	[50.188]	. . .
	γ Geminorum		7	7 25 8.986	−0.329	+0.123	−0.003	−0.495	+0.119	8.401	6 31 18.314	50.087	−0.035
	ϵ Geminorum		7	7 30 57.387	−0.344	+0.152	−0.092	−0.525	+0.136	56.714	6 37 6.520	50.194	+0.072
	ξ Geminorum		7	7 32 54.531	−0.322	+0.149	+0.029	−0.487	+0.141	54.041	6 39 3.930	50.111	−0.011
	43 Camelop.		7	7 35 38.050	−0.531	+0.263	−1.170	−1.326	+0.149	35.435	6 41 45.444	[49.991]	. .
	θ Canis Majoris	W.	7	7 42 52.899	−0.284	+0.164	+0.253	−0.485	+0.170	52.717	6 49 2.477	−0 53 50.240	+0.118

NORMAL EQUATIONS.

$$\begin{aligned} &\text{Assuming } a' = +0^s.154 + da' \text{ circle E.} \\ &a'' = +0.483 + da'' \text{ “ W.} \\ &c = +0.473 + dc \text{ “ E.} \\ &\Delta T = -0^h\,53^m\,50^s.141 + dt. \end{aligned}
\quad
\left\{\begin{aligned} 0 &= +0.693 + 3.892\,da' + 0.577\,dc + 0.911\,dt \\ &\quad -0.083 + 4.118\,da'' + 4.449\,dc - 1.161\,dt \\ &\quad +0.336 + 0.577\,da' + 4.449\,da'' + 24.532\,dc + 1.384\,dt \\ &\quad +0.119 + 0.911\,da' - 1.161\,da'' + 1.384\,dc + 14.377\,dt \end{aligned}\right\}
\quad
\begin{aligned} &\text{whence } da' = -0^s.178 \\ &da'' = +0.043 \\ &dc = -0.018 \\ &dt = +0.008 \end{aligned}$$

$a' = -0^s.024$ (circle east); $a'' = +0^s.526$ (circle west); $c = 0^s.455$ (+ with circle east).

Chronometer No. 1295, at $6^h\,42^m.7$ chron. time, $0^h\,53^m\,50^s.122 \pm 0^s.014$ fast; losing $0^s.169$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 12	19 H. Camelop.	E.	7	5 58 5.757	+0.758	−0.741	−3.522	+2.138	−0.086	4.304	5 4 17.569	−0 53 [46.735]	. . .
	β Orionis	.	7	6 2 57.793	+0.290	−0.292	+0.314	+0.408	−0.073	58.440	5 9 12.224	46.216	−0.025
	τ Orionis		7	6 5 58.736	+0.292	−0.300	+0.296	+0.407	−0.065	59.366	5 12 12.079	46.387	+0.146
	γ Orionis		7	6 12 56.504	+0.312	−0.335	+0.129	+0.406	−0.047	56.969	5 19 10.637	46.332	+0.091
	Groom. 966		7	6 8 41.614	+0.629	−0.699	−2.466	+1.558	−0.031	40.605	5 24 54.645	[45.960]	.
	φ^1 Orionis		7	6 22 29.423	+0.317	−0.359	+0.090	+0.410	−0.021	29.860	5 28 43.642	46.218	−0.023
	θ^2 Orionis		7	6 23 41.489	+0.294	−0.335	+0.278	+0.406	−0.018	42.114	5 29 55.949	46.165	−0.076
	ζ Tauri	E.	7	6 24 46.540	+0.337	−0.387	−0.068	+0.433	−0.015	46.840	5 31 0.713	−0 53 46.127	−0.114
	130 Tauri	W.	7	6 34 45.096	−0.331	−0.116	−0.017	−0.466	+0.011	44.177	5 40 57.946	−0 53 46.231	−0.010
	κ Orionis		7	6 36 16.450	−0.288	−0.099	+0.286	−0.450	+0.015	15.914	5 42 29.688	46.226	−0.015
	α Orionis		7	6 42 56.799	−0.314	−0.099	+0.099	−0.448	+0.033	56.070	5 49 9.900	46.170	−0.071
	η Leporis	.	7	6 45 7.950	−0.281	−0.085	+0.337	−0.458	+0.038	7.501	5 51 21.197	46.304	+0.063
	66 Orionis	.	7	6 52 53.647	−0.309	−0.078	+0.134	−0.445	+0.059	53.008	5 59 6.714	46.294	+0.053
	36 H. Camelop.		7	6 55 30.750	−0.497	−0.118	−1.196	−1.081	+0.066	27.924	6 1 41.686	[46.238]	. . .
	22 H. Camelop.	.	7	7 0 27.357	−0.535	−0.105	−1.468	−1.260	+0.079	24.068	6 6 37.707	[46.361]	. . .
	η Geminorum	W.	7	7 1 58.013	−0.339	−0.061	−0.078	−0.481	+0.083	57.137	6 8 10.917	−0 53 46.220	−0.021

NORMAL EQUATIONS.

$$\begin{aligned} &\text{Assuming } a' = +0^s.811 + da' \text{ circle E.} \\ &a'' = +0.645 + da'' \text{ “ W.} \\ &c = +0.419 + dc \text{ “ E.} \\ &\Delta T = -0^h\,53^m\,46^s.248 + dt. \end{aligned}
\quad
\left\{\begin{aligned} 0 &= +0.222 + 3.455\,da' - 1.951\,dc + 0.644\,dt \\ &\quad -0.010 + 2.679\,da'' + 1.533\,dc + 0.141\,dt \\ &\quad -0.216 - 1.951\,da' + 1.533\,da'' + 19.947\,dc - 0.269\,dt \\ &\quad -0.037 + 0.644\,da' + 0.141\,da'' - 0.269\,dc + 12.601\,dt \end{aligned}\right\}
\quad
\begin{aligned} &\text{whence } da' = -0^s.063 \\ &da'' = +0.001 \\ &dc = +0.005 \\ &dt = +0.006 \end{aligned}$$

$a' = +0^s.748$ (circle east); $a'' = +0.646$ (circle west); $c = 0.424$ (+ with circle east).

Chronometer No. 1295 at $6^h\,30^m.6$ chron. time, $0^h\,53^m\,46^s.241 \pm 0^s.015$ fast, losing $0^s.159$ per hour.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Feb. 13	ι Tauri . . .	E.	7	5 50 9.530	+0.337	—0.073	—0.052	+0.395	—0.100	10.037	4 56 27.514	—0 53 42.523	+0.029
	11 Orionis . . .	.	7	5 51 55.426	+0.326	—0.070	+0.009	+0.381	—0.095	55.977	4 58 13.449	42.528	+0.034
	19 H. Camelop. . .	.	7	5 57 59.943	+0.758	—0.164	—2.482	+1.947	—0.080	59.922	5 4 17.473	[42.449]	. . .
	β Orionis	.	7	6 2 53.900	+0.290	—0.063	+0.221	+0.372	—0.067	54.653	5 9 12.209	42.444	—0.050
	τ Orionis		7	6 5 54.716	+0.292	—0.063	+0.209	+0.371	—0.059	55.466	5 12 12.965	42.501	+0.007
	17 Camelop. . . .		7	6 13 23.743	+0.475	—0.103	—0.845	+0.810	—0.039	24.041	5 19 41.556	[42.485]	. . .
	δ Orionis . .		7	6 20 1.949	+0.302	—0.065	+0.150	+0.368	—0.022	2.682	5 26 20.212	42.470	—0.024
	φ^1 Orionis	E.	7	6 22 25.487	+0.319	—0.068	+0.065	+0.373	—0.016	26.160	5 28 43.629	—0 53 42.531	+0.037
	130 Tauri	W.	7	6 34 41.039	—0.331	+0.124	—0.015	—0.428	+0.016	40.405	5 40 57.904	—0 53 42.501	+0.007
	υ Orionis	.	7	6 42 52.780	—0.314	+0.188	+0.088	—0.411	+0.038	52.369	5 49 9.887	42.482	—0.012
	η Leporis .		7	6 45 3.894	—0.281	+0.181	+0.297	—0.421	+0.044	3.714	5 51 21.183	42.531	+0.037
	66 Orionis . .	.	7	6 52 49.563	—0.309	+0.224	+0.119	—0.409	+0.064	49.252	5 59 6.714	42.538	+0.044
	36 H. Camelop. . .	.	7	6 55 26.329	—0.497	+0.360	—1.056	—0.993	+0.071	24.214	6 1 41.655	[42.559]	. .
	22 H. Camelop. .		7	7 0 22.679	—0.535	+0.375	—1.295	—1.157	+0.084	20.151	6 6 37.668	[42.483]	. . .
	η Geminorum. .		7	7 1 53.899	—0.339	+0.235	—0.068	—0.442	+0.088	53.373	6 8 10.905	42.468	—0.026
	μ Geminorum.	W.	7	7 9 57.954	—0.339	+0.196	—0.068	—0.442	+0.109	57.410	6 16 15.004	—0 53 42.406	—0.088

NORMAL EQUATIONS.

Assuming $a' = +0.522 + da'$ circle E., $a'' = +0.566 + da''$ " W., $c = +0.406 + dc$ " E., $\triangle T = -0^h\,53^m\,42^s.492 + dt$.

$$\left\{\begin{array}{l} 0 = -0.047 + 2.867\,da' \qquad\qquad\qquad - 1.805\,dc + 0.262\,dt \\ \quad +0.026 \qquad\qquad\qquad + 2.498\,da'' + 2.111\,dc - 0.421\,dt \\ \quad +0.361 - 1.805\,da' + 2.111\,da'' + 19.926\,dc - 0.046\,dt \\ \quad +0.028 + 0.262\,da' - 0.421\,da'' - 0.046\,dc + 12.816\,dt \end{array}\right\}$$

whence $da' = +0.005$ s., $da'' = +0.004$, $dc = -0.018$, $dt = -0.002$

$a' = +0^s.527$ (circle east); $a'' = +0^s.570$ (circle west); $c = 0^s.388$ (+ with circle east).

Chronometer No. 1295 at $6^h\,28^m.4$ chron. time, $0^h\,53^m\,42^s.494 \pm 0^s.008$ fast; losing $0^s.157$ per hour.

Date.	Name of star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 14	β Eridani . .	W.	7	5 56 2.657	—0.294	+0.078	+0.181	—0.483	—0.097	2.042	5 2 23.524	—0 53 38.518	—0.078
	β Orionis . . .	.	7	6 2 51.343	—0.290	+0.070	+0.207	—0.486	—0.078	50.766	5 9 12.194	38.572	—0.024
	τ Orionis . . .	.	7	6 5 52.107	—0.292	+0.070	+0.196	—0.484	—0.069	51.528	5 12 12.951	38.577	—0.019
	η Orionis . .	.	7	6 12 32.977	—0.299	+0.080	+0.158	—0.481	—0.051	32.384	5 18 53.748	38.636	+0.040
	Groom. 966 .	.	7	6 18 37.029	—0.629	+0.206	—1.629	—1.855	—0.033	33.089	5 24 54.517	[38.572]	. .
	φ^1 Orionis . .	.	7	6 22 22.924	—0.317	+0.118	+0.059	—0.488	—0.023	22.273	5 28 43.616	38.657	+0.061
	θ^2 Orionis . . .		7	6 23 35.076	—0.294	+0.116	+0.183	—0.483	—0.019	34.579	5 29 55.922	38.657	+0.061
	ζ Tauri . . .	W.	7	6 24 40.074	—0.337	+0.138	—0.045	—0.516	—0.016	39.298	5 31 0.683	—0 53 38.615	+0.019
	κ Orionis	E.	7	6 36 7.350	+0.288	—0.139	+0.319	+0.447	+0.016	8.281	5 42 29.660	—0 53 38.621	+0.025
	α Orionis . .		7	6 42 47.617	+0.314	—0.135	+0.111	+0.445	+0.035	48.387	5 49 9.874	38.513	—0.083
	η Leporis		7	6 44 58.850	+0.281	—0.117	+0.376	+0.455	+0.041	59.886	5 51 21.170	38.716	+0.120
	66 Orionis . .		7	6 52 44.461	+0.309	—0.112	+0.150	+0.442	+0.063	45.313	5 59 6.692	38.621	+0.025
	36 H. Camelop. . .	.	7	6 55 20.257	+0.497	—0.170	—1.337	+1.073	+0.070	20.390	6 1 41.623	[38.767]	. . .
	22 H. Camelop. . .		7	7 0 16.221	+0.535	—0.165	—1.640	+1.251	+0.084	16.286	6 6 37.627	[38.659]	. . .
	η Geminorum .		7	7 1 48.666	+0.339	—0.101	—0.087	+0.478	+0.088	49.383	6 8 10.893	38.490	—0.106
	μ Geminorum . .	E.	7	7 9 52.791	+0.339	—0.086	—0.087	+0.478	+0.111	53.546	6 16 14.992	—0 53 38.554	—0.042

NORMAL EQUATIONS.

Assuming $a' = +0.514 + da'$ circle W., $a'' = +0.718 + da''$ " E., $c = +0.493 + dc$ " E., $\triangle T = -\ 0^h\,53^m\,38^s.596 + dt$.

$$\left\{\begin{array}{l} 0 = +0.037 + 2.099\,da' \qquad\qquad\qquad - 0.306\,dc + 1.487\,dt \\ \quad -0.062 \qquad\qquad\qquad + 2.692\,da'' - 1.635\,dc + 0.048\,dt \\ \quad +0.604 - 0.306\,da' - 1.635\,da'' + 19.056\,dc - 0.047\,dt \\ \quad +0.069 + 1.487\,da' + 0.048\,da'' - 0.047\,dc + 13.531\,dt \end{array}\right\}$$

whence $da' = -0.020$ s., $da'' = +0.004$, $dc = -0.032$, $dt = -0.003$

$a' = +0^s.494$ (circle west); $a'' = +0^s.722$ (circle east). $c = 0^s.461$ (+ with circle east).

Chronometer No. 1295 at $6^h\,30^m.5$ chron. time, $0^h\,53^m\,38^s.596 \pm 0^s.012$ fast, losing $0^s.169$ per hour.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	
Feb. 15	17 Camelop.	E.	7	6 13 16.043	+0.475	−0.270	−1.290	+1.156	−0.115	15.999	5 19 41.485	−0 53[34.514]	. .
	Groom. 966	.	7	6 18 29.064	+0.629	−0.355	−2.651	+2.024	−0.100	28.611	5 24 54.451	[34.160]	. . .
	φ^1 Orionis	.	7	6 22 17.299	+0.317	−0.181	+0.096	+0.532	−0.089	17.974	5 28 43.603	34.371	+0.003
	θ^2 Orionis	.	7	6 23 29.371	+0.294	−0.168	+0.298	+0.528	−0.086	30.237	5 29 55.909	34.328	−0.040
	ι Orionis	.	7	6 26 44.016	+0.298	−0.175	+0.260	+0.526	−0.077	44.848	5 33 10.465	34.383	+0.015
	130 Tauri	.	7	6 34 31.686	+0.331	−0.215	−0.022	+0.551	−0.054	32.277	5 40 57.909	34.368	0.000
	κ Orionis	.	7	6 36 3.103	+0.288	−0.194	+0.355	+0.532	−0.050	4.034	5 42 29.645	34.389	+0.021
	α Orionis	E.	7	6 42 43.523	+0.314	−0.246	+0.124	+0.529	−0.031	44.213	5 49 9.861	−0 53 34.352	−0.016
	66 Orionis	W.	7	6 52 41.506	−0.309	+0.033	+0.202	−0.567	−0.002	40.863	5 59 6.680	−0 53 34.183	−0.185
	36 H. Camelop.	.	7	6 55 19.757	−0.497	+0.061	−1.796	−1.375	+0.006	16.156	6 1 41.590	[34.566]	. .
	22 H. Camelop.		7	7 0 16.343	−0.535	+0.080	−2.204	−1.603	+0.020	12.101	6 6 37.586	[34.515]	. . .
	η Geminorum	.	7	7 1 46.200	−0.339	+0.054	−0.116	−0.612	+0.025	45.212	6 8 10.880	34.332	−0.036
	μ Geminorum		7	7 9 50.311	−0.339	+0.066	−0.116	−0.612	+0.048	49.358	6 16 14.979	34.379	+0.011
	8 Monocerotis		7	7 11 28.407	−0.310	+0.063	+0.195	−0.567	+0.052	27.840	6 17 53.457	34.383	+0.015
	ν Geminorum		7	7 15 57.959	−0.335	+0.074	−0.075	−0.602	+0.066	57.087	6 22 22.589	34.498	+0.130
	23 H. Camelop.	.	7	7 21 1.750	−0.785	+0.182	−4.849	−3.156	+0.080	53.222	6 27 19.525	[33.697]	. . .
	γ Geminorum		7	7 24 53.417	−0.329	+0.077	−0.006	−0.589	+0.091	52.661	6 31 18.274	34.387	+0.019
	ε Geminorum	W.	7	7 30 41.853	−0.344	+0.083	−0.170	−0.625	+0.108	40.905	6 37 6.476	−0 53 34.429	+0.061

NORMAL EQUATIONS.

$$\begin{array}{llll} \text{Assuming } a' = +0^s.801 + da' \text{ circle E.} & \left\{\begin{array}{l} 0 = -0.046 + 2.723\,da' \qquad\qquad - 1.413\,dc + 0.421\,dt \\ \quad +0.131 \qquad\qquad + 3.853\,da'' + 4.615\,dc - 1.441\,dt \\ \quad +0.679 - 1.413\,da' + 4.615\,da'' + 22.970\,dc - 1.740\,dt \\ \quad +0.052 + 0.421\,da' - 1.441\,da'' - 1.740\,dc + 13.935\,dt \end{array}\right\} & \text{whence } da' = +0^s.003 \\ a'' = +0.971 + da'' \text{ `` W.} & & da'' = -0.001 \\ c = +0.575 + dc \text{ `` E.} & & dc = -0.030 \\ \triangle T = -0^h 53^m 34^s.365 + dt. & & dt = -0.008 \end{array}$$

$a' = +0^s.804$ (circle east); $a'' = +0^s.970$ (circle west); $c = 0^s.545$ (+ with circle east).

Chronometer No. 1295 at $6^h 53^m.3$ chron. time, $0^h 53^m 34^s.368 \pm 0^s.013$ fast, losing $0^s.173$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 16	17 Camelop.	W.	7	6 13 15.286	−0.475	+0.006	−1.389	−1.351	−0.082	11.995	5 19 41.449	−0 53[30.546]	. . .
	Groom. 966	.	7	6 18 30.279	−0.629	+0.052	−2.855	−2.364	−0.067	24.416	5 24 54.385	[30.031]	. . .
	φ^1 Orionis	.	7	6 22 14.650	−0.317	+0.041	+0.104	−0.622	−0.057	13.799	5 28 43.590	30.209	−0.107
	θ^2 Orionis		7	6 23 26.691	−0.294	+0.042	+0.321	−0.616	−0.054	26.090	5 29 55.895	30.195	−0.121
	ζ Tauri		7	6 24 32.046	−0.337	+0.054	−0.079	−0.657	−0.051	30.976	5 31 0.652	30.324	+0.008
	σ Orionis		7	6 26 41.360	−0.298	+0.056	+0.280	−0.614	−0.044	40.740	5 33 10.451	30.289	−0.027
	130 Tauri		7	6 34 29.213	−0.331	+0.098	−0.023	−0.644	−0.023	28.290	5 40 57.896	30.394	+0.078
	κ Orionis	W.	7	6 36 0.574	−0.288	+0.089	+0.383	−0.622	−0.019	0.117	5 42 29.630	−0 53 30.487	+0.171
	α Orionis	E.	7	6 42 39.336	+0.314	−0.157	+0.147	+0.578	0.000	40.218	5 49 9.848	−0 53 30.370	+0.054
	η Leporis		7	6 44 50.301	+0.281	−0.143	+0.497	+0.591	+0.005	51.532	5 51 21.142	30.390	+0.074
	66 Orionis	.	7	6 52 35.986	+0.309	−0.163	+0.198	+0.575	+0.027	36.932	5 59 6.668	30.264	−0.052
	36 H. Camelop.		7	6 55 12.029	+0.497	−0.265	−1.767	+1.395	+0.034	11.923	6 1 41.557	[30.366]	. .
	22 H. Camelop.	.	7	7 0 8.214	+0.535	−0.291	−2.167	+1.626	+0.047	7.964	6 6 37.545	[30.419]	. . .
	η Geminorum	.	7	7 1 40.391	+0.339	−0.184	−0.114	+0.621	+0.052	41.105	6 8 10.867	30.238	−0.078
	μ Geminorum	.	7	7 9 44.537	+0.339	−0.194	−0.114	+0.621	+0.074	45.263	6 16 14.966	30.297	−0.019
	ν Geminorum	.	7	7 15 52.144	+0.335	−0.197	−0.073	+0.611	+0.091	52.911	6 22 22.576	30.335	+0.019
	23 H. Camelop.	E.	7	7 20 51.171	+0.785	−0.473	−4.769	+3.200	+0.104	50.018	6 27 19.444	−0 53[30.574]	. . .

NORMAL EQUATIONS.

$$\begin{array}{llll} \text{Assuming } a' = +0^s.957 + da' \text{ circle W.} & \left\{\begin{array}{l} 0 = +0.319 + 2.707\,da' \qquad\qquad + 1.666\,dc + 0.176\,dt \\ \quad -0.594 \qquad\qquad + 4.077\,da'' - 3.924\,dc - 0.786\,dt \\ \quad +1.521 + 1.666\,da' - 3.924\,da'' + 21.867\,dc + 0.564\,dt \\ \quad +0.117 + 0.176\,da' - 0.786\,da'' + 0.564\,dc + 12.935\,dt \end{array}\right\} & \text{whence } da' = -0^s.091 \\ a'' = +0.851 + da'' \text{ `` E.} & & da'' = +0.103 \\ c = +0.637 + dc \text{ `` E.} & & dc = -0.044 \\ \triangle T = -0^h 53^m 30^s.320 + dt. & & dt = 0.000 \end{array}$$

$a' = +0^s.866$ (circle west); $a'' = +0^s.954$ (circle east); $c = 0^s.593$ (+with circle east).

Chronometer No. 1295 at $6^h 42^m.9$ chron. time, $0^h 53^m 30^s.316 \pm 0^s.017$ fast, losing $0^s.165$ per hour.

Transits of stars observed at La Libertad, Salvador, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	$v.$
1889.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Mar. 9	25 Monocerotis	E.	7	8 0 20.829	+0.301	+0.033	+0.018	+0.382	—0.150	21.413	7 31 45.775	—0 28 35.638	+0.149
	α Canis Minoris		7	8 2 4.669	+0.313	+0.031	+0.008	+0.383	—0.143	5.261	7 33 29.804	35.457	—0.032
	Groom. 1374		7	8 15 29.579	+0.566	+0.041	—0.189	+1.400	—0.097	31.300	7 46 55.335	[35.965]	.
	ω¹ Cancri		7	8 22 48.003	+0.341	+0.024	—0.014	+0.423	—0.071	48.706	7 54 13.305	35.401	—0.088
	χ Geminorum		7	8 25 17.163	+0.346	+0.024	—0.017	+0.432	—0.062	17.886	7 56 42.443	35.443	—0.046
	3 Ursæ Majoris		7	8 30 21.064	+0.496	+0.038	—0.134	+1.054	—0.044	22.474	8 1 47.118	[35.356]	. . .
	Br. 1147		7	8 34 10.307	+0.603	+0.050	—0.218	+1.586	—0.031	12.297	8 5 36.990	[35.307]	. . .
	20 Navis		7	8 36 49.174	+0.286	+0.026	+0.030	+0.395	—0.022	49.889	8 8 14.412	35.477	—0.012
	β Cancri	E.	7	8 39 4.917	+0.319	+0.030	+0.004	+0.386	—0.014	5.642	8 10 30.162	—0 28 35.480	—0.009
	30 Monocerotis	W	7	8 48 43.279	—0.302	+0.284	—0.034	—0.422	+0.020	42.825	8 20 7.341	—0 28 35.484	—0.005
	σ Hydræ		7	9 1 33.796	—0.311	+0.270	—0.020	—0.422	+0.065	33.378	8 32 57.980	35.398	—0.091
	γ Cancri		7	9 5 28.179	—0.336	+0.289	+0.018	—0.454	+0.078	27.774	8 36 52.301	35.473	—0.016
	δ Cancri		7	9 6 59.123	—0.331	+0.286	+0.011	—0.444	+0.084	58.729	8 38 23.147	35.582	+0.093
	ε Hydræ		7	9 9 30.340	—0.317	+0.275	—0.014	—0.424	+0.092	29.952	8 40 54.449	35.503	+0.014
	ζ Hydræ		7	9 18 8.033	—0.314	+0.295	—0.014	—0.424	+0.122	7.698	8 49 32.166	35.532	+0.043
	ρ Ursæ Majoris		7	9 21 9.686	—0.489	+0.481	+0.253	—1.127	+0.133	8.937	8 52 33.510	[35.427]	. .
	σ² Ursæ Majoris	W.	7	9 29 15.086	—0.484	+0.554	+0.246	—1.104	+0.161	14.459	9 0 38.945	—0 28 [35.514]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{ll}
\text{Assuming } a' = +0.067 + da' \text{ circle E.} & \\
a'' = -0.145 + da'' \text{ `` W.} & \\
c = +0.421 + dc \text{ `` E.} & \\
\triangle T = -\ 0^h\ 28^m\ 35^s.489 + dt. &
\end{array}
\left\{
\begin{array}{l}
0 = -0.049 + 4.618\,da' \qquad\qquad - 4.321\,dc - 0.883\,dt \\
\quad -0.025 \qquad\qquad + 2.486\,da'' + 2.399\,dc - 0.617\,dt \\
\quad +0.329 - 4.321\,da' + 2.399\,da'' + 21.976\,dc + 0.438\,dt \\
\quad +0.031 - 0.883\,da' - 0.617\,da'' + 0.438\,dc + 12.977\,dt
\end{array}
\right\}
\begin{array}{l}
\text{whence } da' = -0.008 \\
da'' = +0.029 \\
dc = -0.020 \\
dt = -0.001
\end{array}
$$

$a' = +0^s.059$ (circle east); $a'' = -0^s.116$ (circle west); $c = 0^s.401$ (+ with circle east).

Chronometer No. 1295 at $8^h\ 43^m.1$ chron. time, $0^h\ 28^m\ 35^s.489 \pm 0^s.013$ fast, losing $0^s.210$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	$v.$
Mar. 12	66 Orionis	E.	7	6 27 26.937	+0.312	—0.064	+0.077	+0.590	—0.151	27.701	5 59 6.290	—0 28 21.411	—0.015
	ν Orionis		7	6 29 34.527	+0.326	—0.057	—0.011	+0.608	—0.145	35.248	6 1 13.884	21.364	—0.062
	22 H. Camelop.		7	6 34 57.121	+0.501	—0.056	—1.116	+1.668	—0.128	57.990	6 6 36.363	[21.627]	. .
	μ Geminorum		7	6 44 35.196	+0.341	—0.010	—0.081	+0.637	—0.097	35.986	6 16 14.575	21.411	—0.015
	8 Monocerotis		7	6 46 13.626	+0.316	—0.006	+0.073	+0.590	—0.092	14.507	6 17 53.087	21.420	—0.006
	α Argus		7	6 49 49.329	+0.210	0.000	+0.715	+0.969	—0.081	51.142	6 21 29.688	[21.454]	. .
	γ Geminorum		7	6 59 38.481	+0.328	+0.006	—0.026	+0.613	—0.050	39.352	6 31 17.905	21.447	+0.021
	15 Monocerotis		7	7 3 12.420	+0.319	+0.005	+0.029	+0.597	—0.039	13.331	6 34 51.867	21.464	+0.038
	ξ Geminorum		7	7 7 24.036	+0.323	+0.003	+0.004	+0.603	—0.026	24.943	6 39 3.527	21.416	—0.010
	43 Camelop.	E.	7	7 10 4.479	+0.498	0.000	—1.094	+1.642	—0.017	5.508	6 41 44.237	—0 28 [21.271]	. .
	ζ Geminorum	W.	7	7 25 53.964	—0.334	+0.029	+0.037	—0.671	+0.033	53.058	6 57 31.618	—0 28 21.440	+0.014
	λ Geminorum		7	7 40 5.266	—0.328	+0.055	+0.016	—0.656	+0.077	4.430	7 11 42.960	21.470	+0.044
	δ Geminorum		7	7 41 52.054	—0.336	+0.059	+0.045	—0.678	+0.083	51.227	7 13 29.767	21.460	+0.034
	β Canis Minoris		7	7 49 30.269	—0.317	+0.061	—0.024	—0.635	+0.107	29.461	7 21 8.134	21.327	—0.099
	25 Monocerotis		7	8 0 7.969	—0.301	+0.061	—0.082	—0.629	+0.140	7.158	7 31 45.730	21.428	+0.002
	24 Lyncis		7	8 1 59.693	—0.428	+0.087	+0.380	—1.218	+0.146	58.660	7 33 37.341	[21.319]	. .
	κ Geminorum		7	8 6 7.253	—0.340	+0.066	+0.059	—0.691	+0.159	6.506	7 37 45.029	21.477	+0.051
	Groom. 1374		7	8 15 18.379	—0.566	+0.095	+0.881	—2.308	+0.188	16.669	7 46 55.168	[21.501]	. .
	53 Camelop.	W.	5	8 20 36.659	—0.437	+0.062	+0.411	—1.280	+0.204	35.619	7 52 14.197	—0 28 [21.422]	.

NORMAL EQUATIONS.

$$
\begin{array}{ll}
\text{Assuming } a' = +0.459 + da' \text{ circle E.} & \\
a'' = -0.254 + da'' \text{ `` W.} & \\
c = +0.641 + dc \text{ `` E.} & \\
\triangle T = -0^h\ 28^m\ 21^s.428 + dt. &
\end{array}
\left\{
\begin{array}{l}
0 = -0.106 + 3.728\,da' \qquad\qquad - 1.467\,dc - 0.090\,dt \\
\quad +0.204 \qquad\qquad + 3.183\,da'' + 4.032\,dc - 1.722\,dt \\
\quad +0.891 - 1.467\,da' + 4.032\,da'' + 23.946\,dc + 1.022\,dt \\
\quad -0.046 - 0.090\,da' - 1.722\,da'' + 1.022\,dc + 14.889\,dt
\end{array}
\right\}
\begin{array}{l}
\text{whence } da' = +0.016 \\
da'' = -0.021 \\
dc = -0.033 \\
dt = +0.003
\end{array}
$$

$a' = +0^s.475$ (circle east); $a'' = -0^s.275$ (circle west); $c = 0^s.608$ (+ with circle east).

Chronometer No. 1295, at $7^h\ 15^m.5$ chron. time, $0^h\ 28^m\ 21^s.426 \pm 0^s.008$ fast; losing $0^s.189$ per hour.

Transits of stars observed at La Libertad, Salvador, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Mar. 13	α Orionis . . .	W.	7	6 17 27.309	−0.316	+0.038	−0.020	−0.585	−0.417	26.009	5 49 9.440	−0 28 16.569	−0.057
	η Leporis .		7	6 19 38.569	−0.288	+0.039	−0.089	−0.598	−0.410	37.223	5 51 20.704	16.519	−0.107
	γ Geminorum .	.	6	6 59 35.651	−0.328	+0.113	+0.010	−0.605	−0.276	34.565	6 31 17.887	16.678	+0.052
	15 Monocerotis .		7	7 3 9.589	−0.319	+0.111	−0.012	−0.589	−0.264	8.516	6 34 51.849	16.667	+0.041
	ε Geminorum .	.	7	7 5 23.869	−0.341	+0.121	+0.042	−0.641	−0.257	22.793	6 37 6.073	16.720	+0.094
	ξ Geminorum .		7	7 7 21.206	−0.323	+0.116	−0.001	−0.595	−0.250	20.153	6 39 3.509	16.644	+0.018
	θ Canis Majoris .		7	7 17 19.693	−0.291	+0.105	−0.082	−0.593	−0.217	18.615	6 49 2.039	16.576	−0.050
	δ Canis Majoris .		7	7 27 2.029	−0.286	+0.100	−0.094	−0.602	−0.184	0.963	6 58 44.319	16.644	+0.018
	25 Camelop. . . .		7	7 36 3.743	−0.873	+0.283	+1.359	−4.515	−0.154	59.843	7 7 43.724	[16.119]	. .
	λ Geminorum .		7	7 40 0.550	−0.328	+0.102	+0.011	−0.606	−0.141	59.588	7 11 42.945	16.643	+0.017
	Piazzi vii, 67 .		3	7 47 38.289	−0.495	+0.135	+0.422	−1.596	−0.115	36.640	7 19 20.348	[16.292]	.
	24 Lyncis	W.	5	8 1 55.516	−0.428	+0.078	+0.259	−1.125	−0.067	54.233	7 33 37.311	−0 28[16.922]	.
	Groom. 1374 . .	E.	2	8 15 10.319	+0.566	−0.273	−0.509	+1.984	−0.023	12.064	7 46 55.111	−0 28[16.953]	. .
	ω^1 Cancri .		7	8 22 29.154	+0.341	−0.163	−0.037	+0.599	+0.002	29.896	7 54 13.239	16.657	+0.031
	χ Geminorum		7	8 24 58.204	+0.346	−0.165	−0.045	+0.612	+0.010	58.962	7 56 42.385	16.577	−0.049
	ζ^1 Cancri .		7	8 34 6.926	+0.330	−0.153	−0.013	+0.568	+0.041	7.699	8 5 51.120	16.579	−0.047
	β Cancri . .		7	8 38 45.466	+0.319	−0.146	+0.011	+0.547	+0.056	46.753	8 10 30.114	16.639	+0.013
	η Leonis . . .		7	10 29 33.117	+0.329	−0.180	−0.011	+0.565	+0.428	34.248	10 1 17.701	16.547	−0.079
	λ Hydræ		7	10 33 26.899	+0.291	−0.153	+0.069	+0.552	+0.441	28.099	10 5 11.462	16.637	+0.011
	ζ Leonis		7	10 38 47.274	+0.339	−0.172	−0.032	+0.591	+0.458	48.458	10 10 31.791	16.667	+0.041
	γ^1 Leonis . .		7	10 42 7.450	+0.334	−0.165	−0.020	+0.576	+0.469	8.644	10 13 51.965	16.679	+0.053
	ρ Leonis .		7	10 55 14.210	+0.319	−0.146	+0.010	+0.548	+0.513	15.454	10 26 58.827	16.627	+0.001
	35 H. Ursæ Majoris		7	11 3 23.886	+0.505	−0.224	−0.380	+1.554	+0.541	25.882	10 35 9.433	[16.449]	. . .
	α Ursæ Majoris	E.	7	11 25 9.229	+0.447	−0.204	−0.258	+1.164	+0.614	10.992	10 56 54.323	−0 28[16.669]	. .

NORMAL EQUATIONS.

Assuming
$$\begin{aligned} a' &= -\overset{s.}{0.266} + da' \text{ circle W.} \\ a'' &= +0.169 + da'' \quad \text{" E.} \\ c &= +0.596 + dc \quad \text{" E.} \\ \triangle T &= -0^h\,28^m\,16^s.621 + dt. \end{aligned}
\left\{\begin{aligned} 0 = &-0.222 + 4.051\,da' \qquad\qquad\qquad + 2.630\,dc + 0.123\,dt \\ &-0.132 \qquad\qquad + 3.363\,da'' - 4.146\,dc - 1.765\,dt \\ &+0.814 + 2.630\,da' - 4.146\,da'' + 28.977\,dc + 0.449\,dt \\ &+0.130 + 0.123\,da' - 1.765\,da'' + 0.449\,dc + 19.220\,dt \end{aligned}\right\}
\text{whence } \begin{aligned} da' &= +\overset{s.}{0.079} \\ da'' &= -0.010 \\ dc &= -0.036 \\ dt &= -0.007 \end{aligned}$$

$a' = -0^s.187$ (circle west); $a'' = +0^s.159$ (circle east); $c = 0^s.560$ (+ with circle east).

Chronometer No. 1295, at $8^h\,22^m.0$ chron. time, $0^h\,28^m\,16^s.626 \pm 0^s.008$ fast, losing $0^s.201$ per hour.

Transits of stars observed at La Libertad, Salvador, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	
1889. Mar. 14	μ Geminorum	E.	7	6 44 25.754	+0.337	−0.195	−0.039	+0.701	−0.135	26.423	6 16 14.539	−0 28 11.884	+0.025
	8 Monocerotis . .		7	6 46 4.289	+0.312	−0.185	+0.035	+0.649	−0.130	4.970	6 17 53.051	11.919	+0.060
	α Argus . .	.	7	6 49 40.186	+0.210	−0.131	+0.345	+1.066	−0.117	41.559	6 21 29.616	[11.943]	. . .
	23 H. Camelop. . .		7	6 55 26.393	+0.711	−0.483	−1.170	+3.613	−0.097	28.967	6 27 16.895	[12.072]	. . .
	γ Geminorum .		7	6 59 29.001	+0.328	−0.235	−0.012	+0.675	−0.084	29.673	6 31 17.869	11.804	−0.055
	15 Monocerotis .		7	7 3 3.013	+0.319	−0.238	+0.014	+0.657	−0.071	3.694	6 34 51.831	11.863	+0.004
	ε Geminorum .	.	7	7 5 17.153	+0.341	−0.262	−0.052	+0.716	−0.064	17.832	6 37 6.054	11.778	−0.081
	ξ Geminorum	.	7	7 7 14.641	+0.323	−0.254	+0.002	+0.664	−0.057	15.319	6 39 3.491	11.828	−0.031
	43 Camelop. . .		7	7 9 54.521	+0.498	−0.405	−0.528	+1.807	−0.048	55.845	6 41 44.134	[11.711]	. . .
	24 H. Camelop.	E.	7	7 12 2.686	+0.627	−0.522	−0.920	+2.902	−0.041	4.732	6 43 52.604	−0 28[12.128]	. . .
	ζ Geminorum	W.	7	7 25 44.419	−0.334	+0.032	+0.028	−0.734	+0.006	43.417	6 57 31.584	−0 28 11.833	−0.026
	25 Camelop.		7	7 35 59.564	−0.873	+0.222	+1.490	−5.348	+0.041	55.096	7 7 43.578	[11.518]	. . .
	λ Geminorum		7	7 39 55.740	−0.328	+0.097	+0.012	−0.717	+0.054	54.858	7 11 42.929	11.929	+0.070
	Piazzi vii, 67 .	.	7	7 47 33.814	−0.495	+0.174	+0.463	−1.891	+0.080	32.145	7 19 20.300	[11.845]	. . .
	β Canis Minoris .	.	7	7 49 20.730	−0.317	+0.115	−0.018	−0.695	+0.086	19.901	7 21 8.106	11.795	−0.064
	25 Monocerotis . .		7	7 59 58.417	−0.301	+0.109	−0.061	−0.688	+0.123	57.599	7 31 45.698	11.901	+0.042
	α Canis Minoris		7	8 1 42.360	−0.313	+0.111	−0.029	−0.690	+0.129	41.568	7 33 29.732	11.836	−0.023
	κ Geminorum		7	8 5 57.733	−0.340	+0.112	+0.044	−0.756	+0.143	56.936	7 37 44.995	11.941	+0.082
	Groom. 1374 .	W.	7	8 15 9.221	−0.566	+0.137	+0.657	−2.525	+0.175	7.099	7 46 55.054	−0 28[12.045]	. . .

NORMAL EQUATIONS.

Assuming
$a' = +0^s.196 + da'$ circle E.
$a'' = -0.174 + da''$ " W.
$c = +0.719 + dc$ " E.
$\triangle T = -0^h 28^m 11^s.869 + dt.$

$$\left\{\begin{array}{l} 0 = -0.392 + 5.734\,da' \qquad\qquad - 3.917\,dc - 0.645\,dt \\ \quad +0.387 \qquad\qquad + 4.534\,da'' + 4.852\,dc - 1.089\,dt \\ \quad +1.614 - 3.917\,da' + 4.852\,da'' + 25.813\,dc + 0.945\,dt \\ \quad +0.083 - 0.645\,da' - 1.089\,da'' + 0.945\,dc + 13.329\,dt \end{array}\right\}$$

whence $da' = +0^s.033$, $da'' = -0.031$, $dc = -0.052$, $dt = -0.004$

$a' = +0^s.229$ (circle east); $a'' = -0^s.205$ (circle west); $c = 0^s.667$ (+ with circle east).

Chronometer No. 1295 at $7^h\ 24^m.0$ chron. time, $0^h\ 28^m\ 11^s.859 \pm 0^s.011$ fast, losing $0^s.205$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Mar. 16	μ Geminorum	E.	7	6 44 16.611	+0.337	−0.138	−0.041	+0.740	−0.110	17.399	6 16 14.503	−0 28 2.896	−0.110
	ν Geminorum	.	7	6 50 24.346	+0.333	−0.133	−0.030	+0.728	−0.092	25.152	6 22 22.115	3.037	+0.031
	23 H. Camelop.		7	6 55 17.036	+0.711	−0.280	−1.216	+3.815	−0.078	19.988	6 27 16.673	[3.315]	. .
	γ Geminorum . .	.	7	6 59 20.037	+0.328	−0.128	−0.013	+0.712	−0.066	20.870	6 31 17.833	3.037	+0.031
	15 Monocerotis . .	.	7	7 2 53.964	+0.319	−0.123	+0.015	+0.693	−0.056	54.812	6 34 51.795	3.017	+0.011
	ε Geminorum .	.	7	7 5 8.164	+0.341	−0.130	−0.054	+0.755	−0.049	9.027	6 37 6.016	3.011	+0.005
	ξ Geminorum		7	7 7 5.639	+0.323	−0.123	+0.002	+0.701	−0.044	6.498	6 39 3.455	3.043	+0.037
	43 Camelop. . . .		7	7 9 45.343	+0.498	−0.188	−0.548	+1.908	−0.036	46.977	6 41 44.012	[2.965]	. .
	24 H. Camelop.	E.	7	7 11 52.771	+0.627	−0.235	−0.957	+3.064	−0.030	55.240	6 43 52.408	−0 28 [2.832]	. . .
	ζ Geminorum	W.	7	7 25 35.559	−0.334	+0.105	+0.009	−0.773	+0.010	34.576	6 57 31.550	−0 28 3.026	+0.020
	25 Camelop.		7	7 35 51.893	−0.873	+0.335	+0.502	−5.628	+0.040	46.269	7 7 43.284	[2.985]	. .
	λ Geminorum		6	7 39 46.720	−0.328	+0.134	+0.004	−0.755	+0.051	45.826	7 11 42.898	2.928	−0.078
	δ Geminorum .		7	7 41 33.667	−0.337	+0.141	+0.011	−0.781	+0.056	32.757	7 13 29.699	3.058	+0.052
	Piazzi vii, 67 .		7	7 47 25.229	−0.495	+0.223	+0.156	−1.990	+0.073	23.196	7 19 20.204	[2.992]	. .
	β Canis Minoris. .		7	7 49 11.820	−0.317	+0.145	−0.006	−0.731	+0.078	10.989	7 21 8.078	2.911	−0.095
	25 Monocerotis		7	7 59 49.520	−0.301	+0.150	−0.021	−0.724	+0.109	48.733	7 31 45.666	3.067	+0.061
	α Canis Minoris. .		7	8 1 33.517	−0.313	+0.158	−0.010	−0.727	+0.114	32.739	7 33 29.702	3.037	+0.031
	Groom. 1374 . .	W.	7	8 15 0.486	−0.566	+0.300	+0.221	−2.657	+0.153	57.937	7 46 54.936	−0 28 [3.001]	. . .

NORMAL EQUATIONS.

Assuming
$a' = +0^s.166 + da'$ circle E.
$a'' = -0.022 + da''$ " W.
$c = +0.741 + dc$ " E.
$\triangle T = -0^h 28^m 3^s.010 + dt.$

$$\left\{\begin{array}{l} 0 = -0.528 + 4.504\,da' \qquad\qquad - 5.543\,dc - 1.737\,dt \\ \quad +0.420 \qquad\qquad + 4.516\,da'' + 5.324\,dc - 1.039\,dt \\ \quad +1.582 - 5.543\,da' + 5.324\,da'' + 24.435\,dc + 0.140\,dt \\ \quad +0.022 - 1.737\,da' - 1.039\,da'' + 0.140\,dc + 12.790\,dt \end{array}\right\}$$

whence $da' = +0^s.072$, $da'' = -0.047$, $dc = -0.038$, $dt = +0.005$

$a' = +0^s.238$ (circle east); $a'' = -0^s.069$ (circle west); $c = 0^s.703$ (+ with circle east).

Chronometer No. 1295, at $7^h\ 22^m.2$ chron. time, $0^h\ 28^m\ 3^s.006 \pm 0^s.012$ fast, losing $0^s.174$ per hour.

Transits of stars observed at La Libertad, Salvador, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Mar. 17	36 H. Camelop. .	W.	7	6 29 41.864	−0.469	+0.022	−0.260	−1.711	−0.135	39.311	6 1 40.301	−0 27[59.010]	. .
	22 H. Camelop. . .		7	6 34 38.343	−0.501	+0.059	−0.317	−1.994	−0.121	35.469	6 6 36.093	[59.376]	.
	η Geminorum . .	.	7	6 36 10.496	−0.337	+0.046	−0.023	−0.761	−0.117	9.304	6 8 10.372	58.932	+0.025
	μ Geminorum. . .	.	7	6 44 14.463	−0.337	+0.083	−0.023	−0.761	−0.094	13.331	6 16 14.485	58.846	−0.061
	8 Monocerotis . .	.	7	6 45 52.923	−0.312	+0.085	+0.021	−0.705	−0.090	51.922	6 17 52.997	58.925	+0.018
	ν Geminorum. . .		7	6 50 22.094	−0.333	+0.111	−0.017	−0.749	−0.077	21.029	6 22 22.096	58.933	+0.026
	23 H. Camelop.		7	6 55 19.714	−0.711	+0.284	−0.690	−3.926	−0.064	14.607	6 27 16.562	[58.045]	. .
	γ Geminorum . .		7	6 59 17.671	−0.328	+0.149	−0.007	−0.733	−0.052	16.700	6 31 17.815	58.885	−0.022
	15 Monocerotis .	W.	7	7 2 51.614	−0.319	+0.162	+0.008	−0.714	−0.042	50.709	6 34 51.777	−0 27 58.932	+0.025
	43 Camelop. . .	E.	7	7 9 41.050	+0.498	−0.073	−0.433	+1.852	−0.023	42.871	6 41 43.947	−0 27[58.924]	. . .
	24 H. Camelop. .		7	7 11 48.671	+0.627	−0.092	−0.756	+2.974	−0.017	51.407	6 43 52.305	[59.102]	
	θ Canis Majoris.		7	7 16 59.893	+0.291	−0.042	+0.082	+0.678	−0.002	60.900	6 49 1.968	58.932	+0.025
	ζ Geminorum . .		7	7 25 29.371	+0.334	−0.049	−0.025	+0.709	+0.021	30.361	6 57 31.533	58.828	−0.079
	λ Geminorum .		7	7 39 40.774	+0.328	−0.044	−0.011	+0.692	+0.061	41.800	7 11 42.882	58.918	+0.011
	δ Geminorum		7	7 41 27.486	+0.336	−0.044	−0.031	+0.716	+0.066	28.529	7 13 29.682	58.847	−0.060
	β Canis Minoris.		7	7 49 5.801	+0.317	−0.037	+0.017	+0.670	+0.087	6.855	7 21 8.064	58.791	−0.116
	25 Monocerotis . .		7	7 59 43.633	+0.301	−0.029	+0.056	+0.664	+0.117	44.742	7 31 45.650	59.092	+0.185
	α Canis Minoris .	E.	7	8 1 27.521	+0.313	−0.028	+0.026	+0.666	+0.122	28.620	7 33 29.687	−0 27 58.933	+0.026

NORMAL EQUATIONS.

$$
\text{Assuming}\quad
\begin{aligned}
a' &= +0^{s}.154 + da' \quad \text{circle W.}\\
a'' &= +0.206 + da'' \quad \text{“ \ E.}\\
c &= +0.712 + dc \quad \text{“ \ E.}\\
\triangle T &= -0^{h}\,27^{m}\,58^{s}.910 + dt.
\end{aligned}
\quad
\left\{
\begin{aligned}
0 &= +0.214 + 4.039\,da' + 4.964\,dc - 1.701\,dt\\
& \quad -0.022 + 3.114\,da'' - 2.597\,dc - 0.302\,dt\\
& \quad +0.726 + 4.964\,da' - 2.597\,da'' + 23.242\,dc + 0.323\,dt\\
& \quad +0.034 - 1.701\,da' - 0.302\,da'' + 0.323\,dc + 13.896\,dt
\end{aligned}
\right\}
\quad \text{whence}\quad
\begin{aligned}
da' &= -0^{s}.019\\
da'' &= -0.018\\
dc &= -0.029\\
dt &= -0.005
\end{aligned}
$$

$a' = +0^{s}.135$ (circle west); $a'' = +0^{s}.188$ (circle east); $c = 0^{s}.683$ (+ with circle east).

Chronometer No. 1295, at $7^{h}\,17^{m}.9$ chron. time, $0^{h}\,27^{m}\,58^{s}.907 \pm 0^{s}.014$ fast, losing $0^{s}.168$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Mar. 18	22 H. Camelop. . .	E.	7	6 34 30.114	+0.501	−0.091	−0.496	+1.685	−0.112	31.601	6 6 36.039	−0 27[55.562]	.
	η Geminorum .		7	6 36 4.521	+0.337	−0.061	−0.036	+0.643	−0.107	5.297	6 8 10.352	54.945	−0.031
	μ Geminorum .		7	6 44 8.596	+0.337	−0.064	−0.036	+0.643	−0.086	9.390	6 16 14.467	54.923	−0.053
	8 Monocerotis		7	6 45 47.094	+0.312	−0.059	+0.032	+0.596	−0.081	47.894	6 17 52.979	54.915	−0.061
	α Argus	.	7	6 49 23.014	+0.210	−0.041	+0.318	+0.979	−0.072	24.408	6 21 29.472	[54.936]	. . .
	23 H. Camelop. .	.	7	6 55 8.736	+0.711	−0.142	−1.078	+3.317	−0.057	11.487	6 27 16.451	[55.036]	. .
	γ Geminorum .	.	7	6 59 11.996	+0.328	−0.068	−0.011	+0.620	−0.046	12.819	6 31 17.797	55.022	+0.046
	15 Monocerotis .	.	7	7 2 45.847	+0.319	−0.068	+0.013	+0.603	−0.036	46.678	6 34 51.759	54.919	−0.057
	ε Geminorum .	E.	7	7 5 0.114	+0.341	−0.074	−0.048	+0.657	−0.030	0.960	6 37 5.978	−0 27 54.982	+0.006
	24 H. Camelop. . .	W.	7	7 11 49.990	−0.627	+0.303	+0.667	−2.844	−0.012	47.477	6 43 52.206	−0 27[55.271]	. .
	θ Canis Majoris .	.	7	7 16 57.760	−0.291	+0.160	−0.073	−0.648	+0.002	56.910	6 49 1.950	54.960	−0.016
	ζ Geminorum . .		7	7 25 27.243	−0.334	+0.209	+0.022	−0.678	+0.024	26.486	6 57 31.516	54.970	−0.006
	γ Canis Majoris .	.	7	7 26 40.059	−0.286	+0.182	−0.083	−0.658	+0.028	39.242	6 58 44.230	55.012	+0.036
	25 Camelop. . .		7	7 35 41.557	−0.873	+0.590	+1.207	−4.935	+0.052	37.598	7 7 42.998	[54.600]	. . .
	λ Geminorum . .		7	7 39 38.587	−0.328	+0.223	+0.010	−0.662	+0.062	37.892	7 11 42.865	55.027	+0.051
	δ Geminorum . .	.	7	7 41 25.377	−0.336	+0.228	+0.027	−0.685	+0.067	24.678	7 13 29.665	55.013	+0.037
	Piazzi vii, 67 . .	.	7	7 47 16.557	−0.495	+0.328	+0.375	−1.745	+0.083	15.103	7 19 20.108	[54.995]	. . .
	β Canis Minoris .		7	7 49 3.639	−0.317	+0.207	−0.015	−0.641	+0.087	2.960	7 21 8.050	54.910	−0.066
	25 Monocerotis . .	W.	7	7 59 41.424	−0.301	+0.174	−0.050	−0.635	+0.116	40.728	7 31 45.634	−0 27 55.094	+0.118

NORMAL EQUATIONS.

$$
\text{Assuming}\quad
\begin{aligned}
a' &= +0^{s}.291 + da' \quad \text{circle E.}\\
a'' &= -0.159 + da'' \quad \text{“ \ W.}\\
c &= +0.679 + dc \quad \text{“ \ E.}\\
\triangle T &= -0^{h}\,27^{m}\,54^{s}.970 + dt.
\end{aligned}
\quad
\left\{
\begin{aligned}
0 &= +0.177 + 4.221\,da' - 2.383\,dc - 0.431\,dt\\
& \quad +0.301 + 5.074\,da'' + 4.072\,dc - 0.183\,dt\\
& \quad +1.469 - 2.383\,da' + 4.072\,da'' + 25.096\,dc - 0.398\,dt\\
& \quad +0.160 - 0.431\,da' - 0.183\,da'' - 0.398\,dc + 14.184\,dt
\end{aligned}
\right\}
\quad \text{whence}\quad
\begin{aligned}
da' &= -0^{s}.080\\
da'' &= -0.007\\
dc &= -0.065\\
dt &= -0.016
\end{aligned}
$$

$a' = +0^{s}.211$ (circle east); $a'' = -0^{s}.166$ (circle west); $c = 0^{s}.614$ (+ with circle east).

Chronometer No. 1295, at $7^{h}\,16^{m}.3$ chron. time, $0^{h}\,27^{m}\,54^{s}.976 \pm 0^{s}.010$ fast, losing $0^{s}.160$ per hour.

Transits of stars observed at San Juan del Sur, Nicaragua, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v.*
1889.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Mar. 30	Groom. 2001	E.	7	13 36 38. 579	+0. 510	—0. 210	—1. 292	+0. 959	—0. 136	38. 410	13 23 21. 868	—0 13[16. 542]	. . .
	ζ Virginis		7	13 42 19. 236	+0. 309	—0. 157	+0. 084	+0. 281	—0. 120	19. 633	13 29 3. 170	16. 463	+0. 127
	Groom. 2029		7	13 47 50. 871	+0. 496	—0. 288	—1. 198	+0. 900	—0. 105	50. 676	13 34 34. 468	[16. 208]	. . .
	τ Bootis		7	13 55 16. 320	+0. 329	—0. 218	—0. 053	+0. 296	—0. 084	16. 590	13 42 0. 222	16. 368	+0. 032
	89 Virginis		5	13 57 7. 166	+0. 289	—0. 197	+0. 218	+0. 295	—0. 079	7. 692	13 43 51. 431	16. 261	—0. 075
	Bootis		7	14 2 40. 944	+0. 330	—0. 239	—0. 061	+0. 297	—0. 064	41. 207	13 49 24. 960	16. 247	—0. 089
	ι Virginis		7	14 9 16. 780	+0. 311	—0. 232	+0. 068	+0. 281	—0. 046	17. 162	13 56 0. 740	16. 422	+0. 086
	d Bootis	E.	7	14 18 37. 221	+0. 338	—0. 253	—0. 118	+0. 312	—0. 020	37. 480	14 5 21. 240	—0 13 16. 240	—0. 096
	4 Ursæ Minoris	W.	7	14 22 40. 221	—0. 600	—0. 149	+0. 636	—1. 553	—0. 009	38. 546	14 9 22. 490	—0 13[16. 056]	. .
	φ Virginis		7	14 35 46. 786	—0. 307	—0. 056	—0. 032	—0. 321	+0. 027	46. 097	14 22 29. 847	16. 250	—0. 086
	5 Ursæ Minoris		7	14 41 8. 243	—0. 559	—0. 085	+0. 543	—1. 345	+0. 042	6. 839	14 27 50. 300	[16. 539]	. .
	ζ Bootis		7	14 49 8. 749	—0. 324	—0. 035	+0. 008	—0. 331	+0. 064	8. 131	14 35 51. 652	16. 479	+0. 143
	μ Virginis		7	14 50 30. 370	—0. 303	—0. 030	—0. 041	—0. 322	+0. 068	29. 742	14 37 13. 448	16. 294	—0. 042
	109 Virginis		7	14 53 55. 903	—0. 312	—0. 026	—0. 022	—0. 321	+0. 077	55. 299	14 40 39. 018	16. 281	—0. 055
	8 Libræ		7	14 57 50. 659	—0. 292	—0. 018	—0. 067	—0. 333	+0. 088	50. 037	14 44 33. 659	16. 378	+0. 042
	α² Libræ	W.	7	14 58 2. 096	—0. 292	—0. 018	—0. 067	—0. 333	+0. 088	1. 474	14 44 45. 120	—0 13 16. 354	+0. 018

NORMAL EQUATIONS.

$$\begin{array}{llll}
\text{Assuming} & a' = +0.413 + da' \text{ circle E.} & 0 = -0.127 + 3.222\,da' \qquad\qquad - 2.889\,dc - 0.645\,dt & \text{whence } da' = +0.017 \\
& a'' = -0.112 + da'' \quad \text{" W.} & \quad +0.163 \qquad + 3.772\,da'' + 1.899\,dc + 0.772\,dt & da'' = -0.031 \\
& c = +0.327 + dc \quad \text{" E.} & \quad +0.628 - 2.889\,da' + 1.899\,da'' + 20.243\,dc + 0.410\,dt & dc = -0.026 \\
& \triangle T = -0^h\,13^m\,16^s.340 + dt. & \quad +0.006 - 0.645\,da' + 0.772\,da'' + 0.410\,dc + 12.524\,dt & dt = +0.003
\end{array}$$

$a' = +0^s.430$ (circle east); $a'' = -0^s.143$ (circle west); $c = 0^s.301$ (+ with circle east).

Chronometer No. 1295, at $14^h\,25^m.9$ chron. time, $0^h\,13^m\,16^s.336 \pm 0^s.017$ fast, losing $0^s.165$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v.*
Mar. 31	ζ Cancri	E.	7	8 19 3. 696	+0. 329	+0. 011	—0. 030	+0. 159	—0. 166	3. 999	8 5 50. 844	—0 13 13. 155	+0. 002
	20 Navis		7	8 21 26. 793	+0. 293	+0. 011	+0. 114	+0. 157	—0. 159	27. 209	8 8 14. 064	13. 145	—0. 008
	β Cancri		7	8 23 42. 674	+0. 319	+0. 015	+0. 007	+0. 153	—0. 153	43. 015	8 10 29. 845	13. 170	+0. 017
	o Ursæ Majoris		7	8 34 15. 579	+0. 420	+0. 031	—0. 386	+0. 312	—0. 123	15. 833	8 21 2. 680	[13. 153]	. .
	Groom. 1446		7	8 40 34. 957	+0. 524	+0. 045	—0. 791	+0. 549	—0. 105	35. 179	8 27 22. 039	[13. 140]	. . .
	σ Hydræ		7	8 46 10. 393	+0. 313	+0. 032	—0. 032	+0. 151	—0. 089	10. 832	8 32 57. 695	13. 137	—0. 016
	γ Cancri		7	8 50 4. 729	+0. 334	+0. 037	—0. 048	+0. 163	—0. 078	5. 137	8 36 52. 004	13. 133	—0. 020
	δ Cancri	E.	7	8 51 35. 627	+0. 330	+0. 040	—0. 033	+0. 159	—0. 074	36. 049	8 38 22. 865	—0 13 13. 184	+0. 031
	σ² Ursæ Majoris	W.	6	9 13 51. 631	—0. 458	+0. 280	+0. 393	—0. 501	—0. 011	51. 334	9 0 38. 218	—0 13[13. 116]	. . .
	θ Hydræ		7	9 21 49. 191	—0. 312	+0. 202	—0. 026	—0. 191	+0. 012	48. 876	9 8 35. 786	13. 090	—0. 063
	83 Cancri		7	9 26 0. 974	—0. 329	+0. 218	+0. 023	—0. 201	+0. 023	0. 708	9 12 47. 606	13. 102	—0. 051
	1 Draconis		6	9 34 29. 823	—0. 737	+0. 508	+1. 193	—1. 342	+0. 048	29. 493	9 21 16. 610	[12. 883]	. . .
	ε Leonis		7	9 52 46. 936	—0. 337	+0. 231	+0. 044	—0. 210	+0. 099	46. 763	9 39 33. 587	13. 176	+0. 023
	6 Sextantis		7	9 58 52. 459	—0. 305	+0. 204	+0. 047	—0. 191	+0. 117	52. 237	9 45 39. 057	13. 180	+0. 027
	Groom. 1586		7	10 1 42. 443	—0. 515	+0. 340	+0. 557	—0. 669	+0. 125	42. 281	9 48 28. 926	[13. 355]	. . .
	π Leonis		7	10 7 34. 837	—0. 318	+0. 202	—0. 009	—0. 193	+0. 141	34. 660	9 54 21. 470	13. 190	+0. 037
	η Leonis		7	10 14 30. 847	—0. 328	+0. 198	+0. 020	—0. 200	+0. 161	30. 698	10 1 17. 577	13. 121	—0. 032
	α Leonis	W.	7	10 15 41. 634	—0. 323	+0. 191	+0. 004	—0. 196	+0. 164	41. 474	10 2 28. 269	—0 13 13. 205	+0. 052

NORMAL EQUATIONS.

$$\begin{array}{llll}
\text{Assuming} & a' = +0.224 + da' \text{ circle E.} & 0 = -0.091 + 2.723\,da' \qquad\qquad - 2.729\,dc - 0.881\,dt & \text{whence } da' = +0.021 \\
& a'' = -0.159 + da'' \quad \text{" W.} & \quad +0.146 \qquad + 4.444\,da'' + 4.873\,dc - 1.297\,dt & da'' = -0.021 \\
& c = +0.183 + dc \quad \text{" E.} & \quad +0.425 - 2.729\,da' + 4.873\,da'' + 22.838\,dc - 1.130\,dt & dc = -0.012 \\
& \triangle T = -0^h\,13^m\,13^s.151 + dt. & \quad +0.011 - 0.881\,da' - 1.297\,da'' + 1.130\,dc + 13.949\,dt & dt = -0.002
\end{array}$$

$a' = +0^s.245$ (circle east); $a'' = -0^s.180$ (circle west); $c = 0^s.171$ (+ with circle east).

Chronometer No. 1295, at $9^h\,17^m.7$ chron. time, $0^h\,13^m\,13^s.153 \pm 0^s.007$ fast, losing $0^s.170$ per hour.

Transits of stars observed at San Juan del Sur, Nicaragua, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Apr. 1	Groom. 1374 . .	W.	7	8 0 5.086	−0.558	−0.558	−0.072	−0.533	−0.165	3.200	7 46 53.876	−0 13 [9.324]	
	53 Camelop. . .	.	7	8 5 23.929	−0.418	−0.412	−0.034	−0.296	−0.150	22.589	7 52 13.530	[9.059]	
	γ Geminorum		7	8 9 52.229	−0.342	−0.372	−0.007	−0.164	−0.136	51.208	7 56 42.057	9.151	+0.057
	3 Ursæ Majoris, H.	.	7	8 14 56.593	−0.468	−0.520	−0.051	−0.401	−0.122	55.031	8 1 46.080	[8.951]	. . .
	ζ Cancri		7	8 19 0.874	−0.329	−0.368	−0.003	−0.152	−0.110	59.912	8 5 50.829	9.083	−0.011
	β Cancri . .	.	7	8 23 39.819	−0.319	−0.358	+0.001	−0.147	−0.096	38.900	8 10 29.831	9.069	−0.025
	30 Monocerotis . .		7	8 33 17.004	−0.305	−0.329	+0.006	−0.145	−0.068	16.163	8 20 7.018	9.145	+0.051
	η Cancri . . .	.	6	8 39 27.513	−0.332	−0.340	−0.004	−0.155	−0.051	26.631	8 26 17.609	9.022	−0.072
	σ Hydræ . .	W.	7	8 46 7.559	−0.313	−0.294	+0.003	−0.145	−0.031	6.779	8 32 57.680	−0 13 9.099	+0.005
	σ² Cancri . .	E.	7	9 0 37.440	+0.346	−0.092	−0.071	+0.123	+0.011	37.757	8 47 28.630	−0 13 9.127	+0.033
	ζ Hydræ . .		7	9 2 40.650	+0.316	−0.096	+0.015	+0.106	+0.017	41.008	8 49 31.892	9.116	+0.022
	ρ Ursæ Majoris .		7	9 5 41.736	+0.461	−0.160	−0.403	+0.281	+0.025	41.940	8 52 32.697	[9.243]	
	σ² Ursæ Majoris .		7	9 13 47.000	+0.458	−0.199	−0.392	+0.275	+0.049	47.191	9 0 38.176	[9.015]	
	θ Hydræ .		7	9 21 44.501	+0.312	−0.154	+0.026	+0.105	+0.072	44.862	9 8 35.772	9.090	−0.004
	83 Cancri . .		7	9 25 56.321	+0.329	−0.168	−0.023	+0.110	+0.084	56.653	9 12 47.592	9.061	−0.033
	1 Draconis, H. . .	.	7	9 34 25.514	+0.737	−0.393	−1.193	+0.738	+0.108	25.511	9 21 16.499	[9.012]	. . .
	ο Leonis . . .		7	9 48 22.824	+9.320	−0.162	+0.003	+0.107	+0.149	23.241	9 35 14.097	9.144	+0.050
	ε Leonis .	E.	7	9 52 42.183	+0.337	−0.162	−0.044	+0.115	+0.162	42.591	9 39 33.575	−0 13 9.016	−0.078

NORMAL EQUATIONS.

Assuming

$$
\begin{aligned}
a' &= +0^{s}.028 + da' \quad \text{circle W.} \\
a'' &= +0.188 + da'' \quad \text{" E.} \\
c &= +0.128 + dc \quad \text{" E.} \\
\triangle T &= -0^{h}\,13^{m}\,9^{s}.093 + dt.
\end{aligned}
\qquad
\left\{
\begin{aligned}
0 &= +0.037 + 3.910\,da' + 4.652\,dc - 1.805\,dt \\
& +0.018 + 4.452\,da'' - 5.396\,dc - 1.885\,dt \\
& +0.058 + 4.652\,da' - 5.396\,da'' + 24.009\,dc - 0.260\,dt \\
& -0.020 - 1.805\,da' - 1.885\,da'' - 0.260\,dc + 13.295\,dt
\end{aligned}
\right\}
\qquad
\text{whence}\;
\begin{aligned}
da' &= -0^{s}.006 \\
da'' &= -0.008 \\
dc &= -0.003 \\
dt &= -0.001
\end{aligned}
$$

$a' = +0^{s}.022$ (circle west); $a'' = +0^{s}.180$ (circle east); $c = 0^{s}.125$ (+ with circle east).

Chronometer No. 1295, at $8^{h}\,56^{m}.9$, chron. time, $0^{h}\,13^{m}\,9^{s}.094 \pm 0^{s}.009$ fast, losing $0^{s}.174$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction	v.
April 2	κ Geminorum	E.	7	7 50 49.626	+0.337	−0.163	−0.035	+0.091	−0.129	49.727	7 37 44.658	−0 13 5.069	+0.093
	Groom. 1374 . .		7	7 59 58.943	+0.558	−0.278	−0.452	+0.305	−0.103	58.973	7 46 53.805	[5.168]	. . .
	53 Camelop. . .		7	8 5 18.464	+0.418	−0.216	−0.213	+0.169	−0.088	18.534	7 52 13.488	[5.046]	.
	ω¹ Cancri . . .		7	8 7 17.744	+0.338	−0.179	−0.038	+0.092	−0.082	17.875	7 54 12.899	4.976	0.000
	γ Geminorum .		7	8 9 46.816	+0.342	−0.187	−0.045	+0.094	−0.075	46.945	7 56 42.039	4.906	−0.070
	3 Ursæ Majoris, H.		7	8 14 50.750	+0.468	−0.276	−0.322	+0.230	−0.061	50.789	8 1 46.030	[4.759]	
	ζ Cancri . . .		7	8 18 55.627	+0.329	−0.209	−0.017	+0.087	−0.049	55.768	8 5 50.813	4.955	−0.021
	20 Navis . .		7	8 21 18.826	+0.293	−0.195	+0.064	+0.086	−0.042	19.032	8 8 14.028	5.004	+0.028
	β Cancri	E.	7	8 23 34.590	+0.319	−0.223	+0.004	+0.084	−0.035	34.739	8 10 29.816	−0 13 4.923	−0.053
	o Ursæ Majoris	W.	7	8 34 7.993	−0.420	−0.025	+0.441	−0.254	−0.005	7.730	8 21 2.610	−0 13 [5.120]	.
	Groom. 1446 . .		7	8 40 26.693	−0.524	−0.033	+0.901	−0.447	+0.013	26.603	8 27 21.887	[4.716]	. .
	σ Hydræ . .		7	8 46 2.979	−0.313	−0.022	−0.037	−0.123	+0.029	2.513	8 32 57.665	4.848	−0.128
	γ Cancri		7	8 49 57.426	−0.334	−0.024	+0.055	−0.133	+0.041	57.031	8 36 51.972	5.059	+0.083
	δ Cancri	.	7	8 51 28.274	−0.330	−0.025	+0.037	−0.130	+0.045	27.871	8 38 22.833	5.038	+0.062
	ε Hydræ . .		7	8 53 59.561	−0.316	−0.025	−0.022	−0.124	+0.052	59.126	8 40 54.145	4.981	+0.005
	ρ Ursæ Majoris		7	9 5 37.729	−0.461	−0.044	+0.625	−0.329	+0.086	37.606	8 52 32.644	[4.962]	. . .
	κ Cancri .		7	9 14 49.864	−0.321	−0.036	−0.001	−0.125	+0.112	49.493	9 1 44.488	5.005	+0.029
	θ Hydræ	W.	7	9 21 41.086	−0.312	−0.038	−0.041	−0.123	+0.132	40.704	9 8 35.758	−0 13 4.946	−0.030

NORMAL EQUATIONS.

Assuming

$$
\begin{aligned}
a' &= +0^{s}.179 + da' \quad \text{circle E.} \\
a'' &= -0.238 + da'' \quad \text{" W.} \\
c &= +0.122 + dc \quad \text{" E.} \\
\triangle T &= -0^{h}\,13^{m}\,4^{s}.975 + dt.
\end{aligned}
\qquad
\left\{
\begin{aligned}
0 &= +0.075 + 4.153\,da' - 4.953\,dc - 2.079\,dt \\
& +0.230 + 3.743\,da'' + 4.350\,dc - 1.574\,dt \\
& +0.416 - 4.953\,da' + 4.350\,da'' + 23.745\,dc + 0.266\,dt \\
& -0.114 - 2.079\,da' - 1.574\,da'' + 0.266\,dc + 13.520\,dt
\end{aligned}
\right\}
\qquad
\text{whence}\;
\begin{aligned}
da' &= -0^{s}.041 \\
da'' &= -0.041 \\
dc &= -0.019 \\
dt &= -0.002
\end{aligned}
$$

$a' = +0^{s}.138$ (circle east); $a'' = -0^{s}.279$ (circle west); $c = 0^{s}.103$ (+ with circle east).

Chronometer No. 1295, at $8^{h}\,35^{m}.8$ chron. time, $0^{h}\,13^{m}\,4^{s}.976 \pm 0^{s}.013$ fast, losing $0^{s}.180$ per hour.

Transits of stars observed at St. Nicolas Mole, Hayti, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.		s.
1889. Nov. 27	θ Pegasi	W.	7	21 49 44.236	−0.307	−0.100	+0.055	−0.204	−0.032	43.648	22 4 37.545	+0 14 53.897	−0.052
	24 Cephei		7	21 52 48.943	−0.621	−0.225	−0.565	−0.650	−0.030	46.852	22 7 40.680	[53.828]	. .
	θ Aquarii		7	21 56 6.921	−0.281	−0.110	+0.107	−0.205	−0.027	6.405	22 11 0.184	53.779	+0.066
	γ Aquarii		7	22 1 3.731	−0.293	−0.123	+0.083	−0.203	−0.024	3.171	22 15 56.964	53.793	+0.052
	π Aquarii		7	22 4 44.774	−0.298	−0.130	+0.073	−0.203	−0.021	44.195	22 19 38.114	53.919	−0.074
	η Aquarii		7	22 14 47.509	−0.295	−0.124	+0.078	−0.203	−0.014	46.951	22 29 40.825	53.874	−0.029
	31 Cephei		7	22 18 11.107	−0.647	−0.259	−0.616	−0.697	−0.011	8.877	22 33 2.735	[53.858]	. .
	λ Pegasi		7	22 26 19.620	−0.341	−0.113	−0.013	−0.220	−0.006	18.927	22 41 12.731	53.804	+0.041
	ι Cephei	W.	7	22 30 52.893	−0.532	−0.147	−0.389	−0.492	−0.002	51.331	22 45 45.178	+0 14[53.847]	. .
	π Cephei	E.	7	22 49 30.114	+0.690	−0.166	−1.012	+0.622	+0.011	30.259	23 4 24.110	+0 14[53.851]	. . .
	φ Aquarii		7	22 53 41.961	+0.284	−0.051	+0.145	+0.164	+0.014	42.517	23 8 36.355	53.838	+0.007
	γ Piscium		7	22 56 32.243	+0.301	−0.047	+0.096	+0.163	+0.016	32.772	23 11 26.602	53.830	+0.015
	ο Cephei		7	22 59 12.107	+0.554	−0.072	−0.627	+0.426	+0.018	12.406	23 14 6.365	[53.959]	. . .
	υ Pegasi		7	23 4 57.949	+0.341	−0.038	−0.018	+0.177	+0.022	58.433	23 19 52.296	53.863	−0.018
	κ Piscium		7	23 6 22.099	+0.297	−0.033	+0.106	+0.163	+0.023	22.655	23 21 16.477	53.822	+0.023
	θ Piscium		7	23 7 27.747	+0.307	−0.035	+0.079	+0.164	+0.024	28.286	23 22 22.198	53.912	−0.067
	70 Pegasi		7	23 8 40.079	+0.319	−0.036	+0.044	+0.167	+0.025	40.598	23 23 34.405	53.807	+0.038
	41 H. Cephei	E.	7	23 27 45.064	+0.550	−0.180	−0.615	+0.421	+0.038	45.278	23 42 38.990	+0 14[53.712]	. . .

NORMAL EQUATIONS.

$$\begin{array}{llll}
\text{Assuming } a' = +0.193 + da' \text{ circle W.} & 0 = -0.143 + 3.840\,da' \qquad\qquad\quad + 2.413\,dc + 0.330\,dt & \text{whence } da' = +0.031 \\
a'' = +0.348 + da'' \text{ `` E.} & \quad +0.112 \qquad\qquad + 3.631\,da'' - 2.708\,dc + 0.003\,dt & da'' = -0.024 \\
c = +0.173 + dc \text{ `` E.} & \quad -0.371 + 2.413\,da' - 2.708\,da'' + 23.178\,dc + 0.043\,dt & dc = +0.010 \\
\triangle T = +0^h\,14^m\,53^s.846 + dt. & \quad +0.010 + 0.330\,da' + 0.003\,da'' + 0.043\,dc + 13.269\,dt & dt = -0.002
\end{array}$$

$a' = +0^s.224$ (circle west); $a'' = +0^s.324$ (circle east); $c = 0^s.183$ (+ with circle east).

Chronometer No. 1295, at $22^h\,34^m.2$ chron. time, $0^h\,14^m\,53^s.845 \pm 0^s.009$ slow, losing $0^s.043$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Nov. 28	θ[1] Ceti	E.	7	1 3 35.009	+0.280	+0.047	+0.210	+0.214	−0.044	35.716	1 18 31.020	+0 14 55.304	+0.061
	38 Cassiop.		7	1 8 8.243	+0.585	+0.087	−0.957	+0.608	−0.039	8.527	1 23 3.720	[55.193]	. .
	η Piscium		7	1 10 39.411	+0.324	+0.043	+0.039	+0.218	−0.036	39.999	1 25 35.337	55.338	+0.027
	40 Cassiop.		7	1 14 49.436	+0.635	+0.075	−1.146	+0.701	−0.032	49.669	1 29 45.128	[55.459]	. .
	43 Cassiop.		7	1 19 16.879	+0.554	+0.053	−0.838	+0.551	−0.027	17.172	1 34 12.551	[55.379]	. . .
	ν Piscium		7	1 20 46.001	+0.306	+0.026	+0.112	+0.212	−0.025	46.632	1 35 41.971	55.339	+0.026
	ο Piscium		7	1 24 38.661	+0.312	+0.022	+0.085	+0.213	−0.021	39.272	1 39 34.656	55.384	−0.019
	γ Arietis		7	1 32 33.247	+0.333	+0.008	+0.009	+0.223	−0.012	33.808	1 47 29.242	55.434	−0.069
	β Arietis	E.	7	1 33 37.406	+0.336	+0.007	−0.003	+0.225	−0.011	37.960	1 48 33.396	+0 14 55.436	−0.071
	55 Cassiop.	W.	7	1 50 57.879	−0.536	+0.323	−0.444	−0.617	+0.009	56.614	2 5 51.952	+0 14[55.338]	. .
	ξ[1] Ceti		7	1 52 14.724	−0.312	+0.203	+0.050	−0.254	+0.010	14.421	2 7 9.844	55.423	−0.058
	θ Arietis		7	1 57 5.089	−0.334	+0.268	+0.002	−0.266	+0.016	4.775	2 12 0.085	55.310	+0.055
	ο Ceti		7	1 58 51.793	−0.290	+0.245	+0.099	−0.252	+0.018	51.613	2 13 47.058	55.445	−0.080
	ι Cassiop.		7	2 5 6.957	−0.547	+0.516	−0.467	−0.640	+0.024	5.843	2 20 0.933	[55.090]	. .
	ξ[2] Ceti		7	2 7 23.203	−0.312	+0.300	+0.052	−0.254	+0.027	23.016	2 22 18.348	55.332	+0.033
	ν Arietis		7	2 17 38.929	−0.339	+0.326	−0.008	−0.270	+0.038	38.676	2 32 33.923	55.247	+0.118
	δ Ceti		7	2 18 55.209	−0.296	+0.282	+0.085	−0.251	+0.040	55.069	2 33 50.454	55.385	−0.020
	Br. 366	W.	7	2 20 28.293	−0.553	+0.519	−0.479	−0.652	+0.042	27.170	2 35 22.938	+0 14[55.768]	. .

NORMAL EQUATIONS.

$$\begin{array}{llll}
\text{Assuming } a' = +0.468 + da' \text{ circle E.} & 0 = +0.093 + 3.499\,da' \qquad\qquad\quad - 3.053\,dc - 0.363\,dt & \text{whence } da' = -0.034 \\
a'' = +0.314 + da'' \text{ `` W.} & \quad +0.231 \qquad\qquad + 3.129\,da'' + 2.667\,dc - 0.373\,dt & da'' = -0.064 \\
c = +0.241 + dc \text{ `` E.} & \quad +0.300 - 3.053\,da' + 2.667\,da'' + 23.246\,dc - 0.186\,dt & dc = -0.010 \\
\triangle T = +0^h\,14^m\,55^s.356 + dt & \quad -0.160 - 0.363\,da' - 0.373\,da'' - 0.186\,dc + 13.444\,dt & dt = +0.009
\end{array}$$

$a' = +0^s.434$ (circle east); $a'' = +0^s.250$ (circle west); $c = 0^s.231$ (+ with circle east).

Chronometer No. 1295, at $1^h\,43^m.2$ chron. time, $0^h\,14^m\,55^s.365 \pm 0^s.012$ slow, losing $0^s.067$ per hour.

Transits of stars observed at St. Nicholas Mole, Hayti, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1505, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v.*
1889.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Nov. 29	η Aquari	W.	7	22 14 44.497	—0.295	—0.071	+0.026	—0.186	—0.034	43.937	22 29 40.801	+0 14 56.864	+0.004
	31 Cephei		7	22 18 7.400	—0.647	—0.138	—0.204	—0.639	—0.030	5.742	22 33 2.572	[56.830]	. . .
	30 Cephei . . .	.	7	22 19 48.250	—0.506	—0.103	—0.112	—0.410	—0.028	47.091	22 34 44.012	[56.921]	. .
	ζ Pegasi	.	7	22 21 0.850	—0.316	—0.061	+0.012	—0.189	—0.027	0.269	22 35 57.222	56.953	—0.085
	λ Pegasi	.	7	22 26 16.520	—0.341	—0.053	—0.004	—0.202	—0.021	15.899	22 41 12.703	56.804	+0.064
	τ Aquarii . .	.	7	22 28 48.289	—0.269	—0.036	+0.043	—0.192	—0.018	47.817	22 43 44.654	56.837	+0.031
	μ Pegasi		7	22 29 44.170	—0.344	—0.046	—0.006	—0.204	—0.017	43.553	22 44 40.426	56.873	—0.005
	λ Aquarii . . .	W.	7	22 31 54.796	—0.281	—0.034	+0.035	—0.188	—0.014	54.314	22 46 51.211	+0 14 56.897	—0.029
	π Cephei . .	E.	7	22 49 26.714	+0.690	—0.250	—0.684	+0.557	+0.006	27.033	23 4 23.959	+0 14[56.926]	.
	φ Aquarii . .		7	22 53 39.034	+0.284	—0.118	+0.098	+0.147	+0.011	39.456	23 8 36.331	56.875	—0.007
	γ Piscium . .	.	7	22 56 29.339	+0.301	—0.137	+0.065	+0.146	+0.014	29.728	23 11 26.577	56.849	+0.019
	o Cephei .		7	22 59 8.757	+0.554	—0.269	—0.424	+0.382	+0.018	9.018	23 14 6.269	[57.251]	
	υ Pegasi		7	23 4 55.120	+0.341	—0.191	—0.012	+0.158	+0.024	55.440	23 19 52.265	56.825	+0.043
	κ Piscium .		7	23 6 19.250	+0.297	—0.171	+0.072	+0.146	+0.026	19.620	23 21 16.455	56.835	+0.033
	θ Piscium . .		7	23 7 24.933	+0.307	—0.181	+0.053	+0.147	+0.027	25.286	23 22 22.176	56.890	—0.022
	70 Pegasi . . .		7	23 8 37.131	+0.319	—0.194	+0.030	+0.149	+0.028	37.463	23 23 34.381	56.918	—0.050
	γ Cephei .	E.	7	23 19 54.257	+0.760	—0.577	—0.819	+0.650	+0.042	54.313	23 34 50.617	+0 14[56.304]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +0^s.078 + da' \text{ circle W.} & \left\{\begin{array}{l} 0 = -0.001 + 2.666\,da' \qquad\qquad + 1.156\,dc + 0.489\,dt \\ \quad +0.228 \qquad\qquad + 4.047\,da'' - 3.044\,dc + 0.136\,dt \\ \quad -0.264 + 1.156\,da' - 3.044\,da'' + 21.772\,dc + 0.190\,dt \\ \quad -0.148 + 0.489\,da' + 0.136\,da'' + 0.190\,dc + 12.977\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = -0^s.004 \\ da'' = -0.053 \\ dc = +0.005 \\ dt = +0.012 \end{array} \\
& a'' = +0.272 + da'' \quad \text{" E.} & & \\
& c = +0.161 + dc \quad \text{" E.} & & \\
\triangle T & = +0^h\,14^m\,56^s.862 + dt. & &
\end{array}
$$

$a' = +0^s.074$ (circle west); $a'' = +0^s.219$ (circle east); $c = 0^s.166$ (+with circle east).

Chronometer No. 1295, at $22^h\,44^m.1$ chron. time, $0^h\,14^m\,56^s.868 \pm 0^s.008$ slow, losing $0^s.070$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v.*
Nov. 30	31 Cephei . .	E.	7	22 18 2.871	+0.647	—0.156	—0.033	+0.670	—0.036	3.963	22 33 2.498	+0 14[58.535]	. .
	ζ Pegasi		7	22 20 58.409	+0.316	—0.094	+0.002	+0.198	—0.033	58.798	22 35 57.210	58.412	+0.008
	λ Pegasi		7	22 26 13.910	+0.341	—0.132	—0.001	+0.212	—0.027	14.303	22 41 12.689	58.386	+0.034
	τ Aquarii . . .		7	22 28 45.954	+0.269	—0.114	+0.007	+0.201	—0.025	46.292	22 43 44.638	58.346	+0.074
	μ Pegasi . . .	.	7	22 29 41.587	+0.344	—0.151	—0.001	+0.214	—0.024	41.969	22 44 40.406	58.437	—0.017
	λ Aquarii . . .		7	22 31 52.390	+0.281	—0.132	+0.006	+0.197	—0.022	52.720	22 46 51.199	58.479	—0.059
	α Pegasi .	.	7	22 44 16.856	+0.324	—0.175	+0.001	+0.201	—0.009	17.198	22 59 15.691	58.493	—0.073
	π Cephei.	.	6	22 49 24.615	+0.690	—0.370	—0.037	+0.744	—0.004	25.638	23 4 23.883	[58.245]	. . .
	γ Piscium	E.	7	22 56 27.807	+0.301	—0.153	+0.004	+0.195	+0.003	28.157	23 11 26.561	+0 14 58.404	+0.016
	υ Pegasi	W.	7	23 4 54.333	—0.341	+0.062	+0.001	—0.255	+0.011	53.811	23 19 52.246	+0 14 58.435	—0.015
	κ Piscium . . .	.	7	23 6 18.486	—0.297	+0.055	—0.008	—0.235	+0.013	18.014	23 21 16.444	58.430	—0.010
	θ Piscium .	.	7	23 7 24.217	—0.307	+0.057	—0.006	—0.236	+0.014	23.739	23 22 22.165	58.426	—0.006
	70 Pegasi		7	23 8 36.437	—0.319	+0.060	—0.003	—0.240	+0.015	35.950	23 23 34.368	58.418	+0.002
	γ Cephei	.	7	23 19 53.479	—0.760	+0.154	+0.090	—1.046	+0.026	51.943	23 34 50.533	[58.590]	. . .
	41 H. Cephei .		7	23 27 41.236	—0.550	+0.121	+0.046	—0.606	+0.034	40.281	23 42 38.869	[58.588]	. .
	φ Pegasi	.	7	23 31 54.679	—0.332	+0.075	—0.001	—0.248	+0.038	54.211	23 46 52.546	58.335	+0.085
	ω Piscium . .	.	7	23 38 40.807	—0.308	+0.073	—0.006	—0.236	+0.045	40.375	23 53 38.831	58.456	—0.036
	Br. 6 . .	W.	7	23 55 3.693	—0.736	+0.196	+0.085	—0.995	+0.062	2.305	0 10 0.358	+0 14[58.053]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +0^s.034 + da' \text{ circle E.} & \left\{\begin{array}{l} 0 = +0.083 + 3.065\,da' \qquad\qquad - 1.446\,dc + 0.658\,dt \\ \quad -0.165 \qquad\qquad + 3.879\,da'' + 3.582\,dc - 0.325\,dt \\ \quad -0.421 - 1.446\,da' + 3.582\,da'' + 23.117\,dc + 0.541\,dt \\ \quad +0.004 + 0.658\,da' - 0.325\,da'' + 0.541\,dc + 13.743\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = -0^s.022 \\ da'' = +0.031 \\ dc = +0.012 \\ dt = +0.001 \end{array} \\
& a'' = -0.055 + da'' \quad \text{" W.} & & \\
& c = +0.203 + dc \quad \text{" E.} & & \\
\triangle T & = +0^h\,14^m\,58^s.420 + dt. & &
\end{array}
$$

$a' = +0^s.012$ (circle east); $a'' = -0^s.024$ (circle west); $c = 0^s.215$ (+ with circle east).

Chronometer No. 1295, at $22^h\,53^m.6$ chron. time, $0^h\,14^m\,58^s.420 \pm 0^s.009$ slow, losing $0^s.060$ per hour.

Transits of stars observed at St. Nicolas Mole, Hayti, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 1	31 Cephei.	W.	7	22 18 5. 793	−0. 647	−0. 368	−1. 590	−0. 550	−0. 029	2. 609	22 33 2. 423	+0 14[59. 814]	. . .
	ζ Pegasi	.	7	22 20 58. 044	−0. 316	−0. 169	+0. 098	−0. 163	−0. 027	57. 467	22 35 57. 198	59. 731	+0. 039
	λ Pegasi		7	22 26 13. 670	−0. 341	−0. 168	−0. 035	−0. 174	−0. 022	12. 930	22 41 12. 675	59. 745	+0. 025
	τ Aquarii	.	7	22 28 45. 080	−0. 269	−0. 128	+0. 333	−0. 165	−0. 020	44. 831	22 43 44. 621	59. 790	−0. 020
	μ Pegasi		7	22 29 41. 397	−0. 344	−0. 160	−0. 046	−0. 175	−0. 019	40. 653	22 44 40. 387	59. 734	+0. 036
	λ Aquarii		7	22 31 51. 691	−0. 281	−0. 128	+0. 274	−0. 162	−0. 017	51. 377	22 46 51. 187	59. 810	−0. 040
	α Pegasi . . .		7	22 44 16. 480	−0. 324	−0. 133	+0. 054	−0. 165	−0. 007	15. 905	22 59 15. 679	59. 774	−0. 004
	π Cephei. . .	W.	7	22 49 27. 393	−0. 690	−0. 282	−1. 805	−0. 610	−0. 002	24. 004	23 4 23. 807	+0 14[59. 803]	. . .
	υ Pegasi	E.	7	23 4 52. 043	+0. 341	−0. 046	−0. 032	+0. 130	+0. 011	52. 44	23 19 52. 229	+0 14 59. 782	−0. 012
	κ Piscium	.	7	23 6 16. 056	+0. 297	−0. 042	+0. 186	+0. 120	+0. 012	16. 629	23 21 16. 433	59. 804	−0. 034
	θ Piscium		7	23 7 21. 757	+0. 307	−0. 046	+0. 139	+0. 121	+0. 013	22. 291	23 22 22. 154	59. 863	−0. 093
	70 Pegasi .		7	23 8 34. 103	+0. 319	−0. 051	+0. 077	+0. 123	+0. 014	34. 585	23 23 34. 357	59. 772	−0. 002
	γ Cephei. .	.	7	23 19 51. 686	+0. 760	−0. 174	−2. 124	+0. 534	+0. 024	50. 706	23 34 50. 447	[59. 741]	. .
	ω² Aquarii .		7	23 21 59. 626	+0. 267	−0. 064	+0. 337	+0. 124	+0. 026	60. 316	23 36 59. 984	59. 668	+0. 102
	41 H. Cephei		7	23 27 39. 436	+0. 550	−0. 152	−1. 079	+0. 310	+0. 031	39. 096	23 42 38. 825	[59. 729]	
	φ Pegasi . .	E.	7	23 31 52. 363	+0. 332	−0. 100	+0. 014	+0. 127	+0. 035	52. 771	23 46 52. 535	+0 14 59. 764	+0. 006

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +0^s.551 + da' \ \text{circle W.} & \left\{\begin{array}{l} 0 = -0.082 + 3.036\,da' \qquad\qquad + 1.812\,dc + 0.344\,dt \\ \quad +0.093 \qquad\qquad + 2.841\,da'' - 1.603\,dc + 0.411\,dt \\ \quad -0.116 + 1.812\,da' - 1.603\,da'' + 20.345\,dc + 0.014\,dt \\ \quad -0.004 + 0.344\,da' + 0.411\,da'' + 0.014\,dc + 12.642\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = +0^s.027 \\ da'' = -0.033 \\ dc = +0.001 \\ dt = +0.001 \end{array} \\
& a'' = +0.601 + da'' \ \text{" E.} & & \\
& c = +0.139 + dc \ \text{" E.} & & \\
& \triangle T = +0^h\,14^m\,59^s.769 + dt. & &
\end{array}
$$

$a' = +0^s.578$ (circle west); $a'' = +0^s.568$ (circle east); $c = 0^s.140$ (+ with circle east).

Chronometer No. 1295, at $22^h\,51^m.9$ chron. time, $0^h\,14^m\,59^s.770 \pm 0^s.009$ slow, losing $0^s.052$ per hour.

Date.	Name of star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 2.	λ Aquarii .	E.	7	22 31 49. 369	+0. 281	0. 000	+0. 265	+0. 326	−0. 031	50. 210	22 46 51. 175	+0 15 0. 965	−0. 012
	δ Aquarii . .		7	22 33 45. 436	+0. 265	0. 000	+0. 344	+0. 337	−0. 029	46. 353	22 48 47. 294	0. 941	+0. 012
	α Pegasi . . .		7	22 44 14. 001	+0. 324	0. 000	+0. 053	+0. 334	−0. 021	14. 691	22 59 15. 667	0. 976	−0. 023
	π Cephei .		7	22 49 22. 786	+0. 690	0. 000	−1. 746	+1. 2[illegible]2	−0. 017	22. 945	23 4 23. 731	[0. 786]	.
	φ Aquarii . .		7	22 53 34. 459	+0. 284	0. 000	+0. 250	+0. 325	−0. 014	35. 304	23 8 36. 295	0. 991	−0. 038
	γ Piscium .	.	7	22 56 24. 804	+0. 301	0. 000	+0. 165	+0. 323	−0. 012	25. 581	23 11 26. 529	0. 948	+0. 005
	ο Cephei		7	22 59 4. 693	+0. 554	0. 000	−1. 082	+0. 845	−0. 009	5. 001	23 14 6. 125	[1. 124]	. . .
	υ Pegasi	E.	7	23 4 50. 660	+0. 341	0. 000	−0. 031	+0. 350	−0. 005	51. 315	23 19 52. 211	+0 15 0. 896	+0. 057
	ι Piscium . .	W.	7	23 19 15. 836	−0. 306	+0. 192	+0. 125	−0. 364	+0. 006	15. 489	23 34 16. 483	+0 15 0. 994	−0. 041
	ω² Aquarii . .		7	23 21 59. 196	−0. 267	+0. 178	+0. 289	−0. 376	+0. 009	59. 029	23 36 59. 973	0. 944	+0. 009
	41 H. Cephei		7	23 27 39. 886	−0. 550	+0. 407	−0. 925	−0. 937	+0. 013	37. 894	23 42 38. 781	[0. 887]	. .
	φ Pegasi .		7	23 31 52. 036	−0. 332	+0. 260	+0. 012	−0. 383	+0. 016	51. 609	23 46 52. 524	0. 915	+0. 038
	ω Piscium		7	23 38 38. 130	−0. 308	+0. 256	+0. 115	−0. 365	+0. 022	37. 850	23 53 38. 811	0. 961	−0. 008
	33 Piscium .		7	23 44 40. 537	−0. 284	+0. 243	+0. 216	−0. 365	+0. 026	40. 373	23 59 41. 361	0. 988	−0. 035
	γ Pegasi .		7	23 52 32. 846	−0. 324	+0. 278	+0. 046	−0. 375	+0. 032	32. 503	0 7 33. 422	0. 919	+0. 034
	κ Cassiop. .	W.	7	0 11 45. 371	−0. 500	+0. 379	−0. 709	−0. 782	+0. 048	43. 807	0 26 44. 856	+0 15 [1. 049]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +0^s.531 + da' \ \text{circle E.} & \left\{\begin{array}{l} 0 = -0.097 + 3.117\,da' \qquad\qquad - 0.923\,dc + 0.975\,dt \\ \quad +0.052 \qquad\qquad + 2.375\,da'' + 0.712\,dc + 0.636\,dt \\ \quad +0.234 - 0.923\,da' + 0.712\,da'' + 19.653\,dc - 0.240\,dt \\ \quad -0.029 + 0.975\,da' + 0.636\,da'' - 0.240\,dc + 13.000\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = +0^s.028 \\ da'' = -0.019 \\ dc = -0.010 \\ dt = +0.001 \end{array} \\
& a'' = +0.506 + da'' \ \text{" W.} & & \\
& c = +0.353 + dc \ \text{" E.} & & \\
& \triangle T = +0^h\,15^m\,0^s.955 + dt. & &
\end{array}
$$

$a' = +0^s.559$ (circle east); $a'' = +0^s.487$ (circle west); $c = 0^s.343$ (+ with circle east).

Chronometer No. 1295, at $23^h\,11^m.1$ chron. time, $0^h\,15^m\,0^s.953 \pm 0^s.006$ slow, losing $0^s.047$ per hour.

Transits of stars observed at St. Nicolas Mole, Hayti, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 3	φ Aquarii .	W.	7	22 53 34.596	−0.284	+0.103	+0.146	−0.428	−0.025	34.108	23 8 36.283	+0 15 2.175	−0.075
	γ Piscium . . .		7	22 56 24.964	−0.301	+0.110	+0.096	−0.425	−0.023	24.421	23 11 26.513	2.092	+0.008
	ο Cephei . . .	.	7	22 59 5.964	−0.554	+0.204	−0.633	−1.111	−0.021	3.849	23 14 6.077	[2.228]	.
	4 Cassiop. .		7	23 4 56.214	−0.494	+0.188	−0.460	−0.896	−0.017	54.535	23 19 56.551	[2.016]	
	κ Piscium . .	.	7	23 6 14.884	−0.297	+0.113	+0.107	−0.425	−0.016	14.366	23 21 16.411	2.045	+0.055
	θ Piscium	.	7	23 7 20.606	−0.307	+0.118	+0.080	−0.427	−0.015	20.055	23 22 22.132	2.077	+0.023
	70 Pegasi . . .	.	7	23 8 32.854	−0.319	+0.124	+0.044	−0.435	−0.014	32.254	23 23 34.333	2.079	−0.021
	ι Piscium . .	W.	7	23 19 14.867	−0.306	+0.125	+0.084	−0.427	−0.006	14.337	23 34 16.472	+0 15 2.135	−0.035
	41 H. Cephei . .	E.	7	23 27 36.021	+0.550	−0.119	−0.811	+0.993	+0.001	36.635	23 42 38.736	+0 15 [2.101]	. . .
	φ Pegasi . .		7	23 31 49.763	+0.332	−0.081	+0.010	+0.406	+0.004	50.434	23 46 52.513	2.079	+0.021
	ω Piscium .		7	23 38 35.993	+0.308	−0.090	+0.101	+0.387	+0.009	36.708	23 53 38.801	2.093	+0.007
	33 Piscium . .		7	23 44 38.451	+0.284	−0.096	+0.190	+0.387	+0.014	39.230	23 59 41.351	2.121	−0.021
	γ Pegasi		7	23 52 30.637	+0.324	−0.128	+0.041	+0.398	+0.020	31.292	0 7 33.411	2.119	−0.019
	ι Ceti . .	.	7	23 58 45.603	+0.278	−0.123	+0.212	+0.390	+0.024	46.384	0 13 48.498	2.114	−0.014
	44 Piscium .		7	0 4 42.187	+0.299	−0.144	+0.135	+0.385	+0.029	42.891	0 19 44.960	2.069	+0.031
	κ Cassiop. .	E.	7	0 11 42.236	+0.500	−0.265	−0.621	+0.829	+0.034	42.713	0 26 44.824	+0 15 [2.111]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +0.^{s}335 + da' \ \text{circle W.} & 0 = +0.010 + 2.221\,da' \qquad\qquad + 0.663\,dc + 0.698\,dt & \text{whence } da' = -0.^{s}008 \\
& a'' = +0.383 + da'' \ \text{" E.} & -0.085 \qquad + 2.302\,da'' - 0.764\,dc + 0.599\,dt & da'' = +0.044 \\
& c = +0.388 + dc \ \text{" E.} & -0.282 + 0.663\,da' - 0.764\,da'' + 19.070\,dc + 0.070\,dt & dc = +0.017 \\
& \triangle T = +0^{h}\,15^{m}\,2^{s}.105 + dt. & +0.043 + 0.698\,da' + 0.599\,da'' + 0.070\,dc + 13.238\,dt & dt = -0.005
\end{array}
$$

$a' = +0^{s}.327$ (circle west); $a'' = +0^{s}.427$ (circle east); $c = 0^{s}.405$ (+ with circle east).

Chronometer No. 1295, at $23^{h}\,26^{m}.8$ chron. time, $0^{h}\,15^{m}\,2^{s}.100 \pm 0^{s}.007$ slow, losing $0^{s}.046$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 4	β Pegasi	E.	7	22 43 21.456	+0.352	−0.115	−0.068	+0.446	−0.027	22.044	22 58 25.286	+0 15 3.242	−0.070
	α Pegasi . .	.	7	22 44 11.751	+0.324	−0.105	+0.042	+0.409	−0.026	12.395	22 59 15.642	3.247	−0.075
	π Cephei . . .		7	22 49 19.979	+0.690	−0.217	−1.412	+1.510	−0.022	20.528	23 4 23.578	[3.050]	
	φ Aquarii . . .		7	22 53 32.319	+0.284	−0.086	+0.202	+0.399	−0.019	33.099	23 8 36.272	3.173	−0.001
	γ Piscium . .		7	22 56 22.630	+0.301	−0.090	+0.133	+0.396	−0.017	23.353	23 11 26.500	3.147	+0.025
	ο Cephei. . .		7	22 59 2.271	+0.554	−0.162	−0.875	+1.036	−0.015	2.809	23 14 6.028	[3.219]	. .
	υ Pegasi		7	23 4 48.446	+0.341	−0.096	−0.025	+0.430	−0.011	49.085	23 19 52.179	3.094	+0.078
	κ Piscium . .	E.	7	23 6 12.533	+0.297	−0.082	+0.148	+0.396	−0.010	13.282	23 21 16.400	+0 15 3.118	+0.054
	γ Cephei . .	W.	5	23 19 50.471	−0.760	+0.249	−0.950	−1.942	0.000	47.068	23 34 50.188	+0 15 [3.120]	. . .
	ω² Aquarii . .		7	23 21 57.231	−0.267	+0.087	+0.151	−0.452	+0.002	56.752	23 36 59.950	3.198	−0.026
	41 H. Cephei . . .		6	23 27 37.557	−0.550	+0.176	−0.482	−1.125	+0.006	35.582	23 42 38.691	[3.1:9]	. . .
	φ Pegasi		5	23 31 50.049	−0.332	+0.106	+0.006	−0.460	+0.009	49.378	23 46 52.502	3.124	+0.048
	ω Piscium . .		7	23 38 36.199	−0.308	+0.096	+0.060	−0.439	+0.014	35.622	23 53 38.790	3.168	+0.004
	α Andromedæ .		7	23 47 38.866	−0.354	+0.107	−0.044	−0.496	+0.020	38.099	0 2 41.260	3.161	+0.011
	ι Ceti		7	23 58 45.819	−0.278	+0.080	+0.126	−0.442	+0.029	45.334	0 13 48.488	3.154	+0.018
	12 Ceti	W.	7	0 9 21.930	−0.288	+0.080	+0.105	−0.437	+0.036	21.426	0 24 24.670	+0 15 3.244	−0.072

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +0.^{s}424 + da' \ \text{circle E.} & 0 = -0.095 + 2.643\,da' \qquad\qquad - 1.885\,dc + 0.063\,dt & \text{whence } da' = +0.^{s}028 \\
& a'' = +0.264 + da'' \ \text{" W.} & +0.041 \qquad + 2.954\,da'' + 1.048\,dc + 0.799\,dt & da'' = -0.010 \\
& c = +0.427 + dc \ \text{" E.} & +0.275 - 1.885\,da' + 1.048\,da'' + 20.033\,dc + 0.137\,dt & dc = -0.011 \\
& \triangle T = +0^{h}\,15^{m}\,3^{s}.173 + dt. & +0.039 + 0.063\,da' + 0.799\,da'' + 0.137\,dc + 12.718\,dt & dt = -0.003
\end{array}
$$

$a' = +0^{s}.452$ (circle east); $a'' = +0^{s}.254$ (circle west); $c = 0^{s}.416$ (+ with circle east).

Chronometer No. 1295, at $23^{h}\,19^{m}.7$ chron. time, $0^{h}\,15^{m}\,3^{s}.172 \pm 0^{s}.010$ slow, losing $0^{s}.044$ per hour.

Transits of stars observed at St. Nicolas Mole, Hayti, by Lieut J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 13	π Cephei .	E.	7	22 49 11. 371	+0. 690	−0. 116	−1. 615	+1. 247	−0. 047	11. 530	23 4 22. 879	+0 15[11. 349]	. . .
	φ Aquarii . .		7	22 53 23. 861	+0. 284	−0. 046	+0. 232	+0. 329	−0. 042	24. 618	23 8 36. 174	11. 556	−0. 034
	ο Cephei . . .		6	22 58 53. 606	+0. 554	−0. 086	−1. 000	+0. 855	−0. 035	53. 895	23 14 5. 588	[11. 693]	. . .
	υ Pegasi . . .		7	23 4 40. 004	+0. 341	−0. 051	−0. 029	+0. 355	−0. 028	40. 592	23 19 52. 071	11. 479	+0. 043
	κ Piscium . .		6	23 6 4. 117	+0. 297	−0. 043	+0. 170	+0. 327	−0. 026	4. 842	23 21 16. 301	11. 459	+0. 063
	θ Piscium . . .		7	23 7 9. 796	+0. 307	−0. 044	+0. 126	+0. 329	−0. 025	10. 489	23 22 22. 022	11. 533	−0. 011
	70 Pegasi . .		7	23 8 22. 016	+0. 319	−0. 047	+0. 070	+0. 335	−0. 024	22. 669	23 23 34. 222	11. 553	−0. 031
	72 Pegasi		7	23 13 16. 499	+0. 360	−0. 046	−0. 114	+0. 380	−0. 018	17. 061	23 28 28. 566	11. 505	+0. 017
	ι Piscium .	E.	7	23 19 4. 101	+0. 306	−0. 041	+0. 132	+0. 328	−0. 010	4. 816	23 34 16. 362	+0 15 11. 546	−0. 024
	41 H. Cephei .	W.	7	23 27 29. 050	−0. 550	+0. 280	−1. 006	−0. 947	0. 000	26. 827	23 42 38. 273	+0 15[11. 446]	. . .
	ω Piscium .		7	23 38 27. 541	−0. 308	+0. 154	+0. 125	−0. 369	+0. 013	27. 156	23 53 38. 692	11. 536	−0. 014
	33 Piscium . .		7	23 44 30. 003	−0. 284	+0. 142	+0. 235	−0. 369	+0. 021	29. 748	23 59 41. 242	11. 494	+0. 028
	α Andromedæ .		7	23 47 30. 227	−0. 354	+0. 176	−0. 091	−0. 418	+0. 025	29. 565	0 2 41. 134	11. 569	−0. 047
	γ Pegasi . .		5	23 52 22. 202	−0. 324	+0. 159	+0. 050	−0. 379	+0. 031	21. 739	0 7 33. 292	11. 553	−0. 031
	ι Ceti . . .		7	23 58 37. 094	−0. 278	+0. 136	+0. 263	−0. 372	+0. 038	36. 881	0 13 48. 400	11. 519	+0. 003
	44 Piscium . . .		7	0 4 33. 680	−0. 299	+0. 145	+0. 168	−0. 367	+0. 046	33. 373	0 19 44. 860	11. 487	+0. 035
	κ Cassiop.	W.	2	0 11 34. 722	−0. 500	+0. 241	−0. 771	−0. 790	+0. 054	32. 956	0 26 44. 519	+0 15[11. 563]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{lll}
\text{Assuming } a' = +\overset{s.}{0.439} + da' \text{ circle E.} & \left\{\begin{array}{l} 0 = -0.217 + 2.672\,da' \qquad\qquad\qquad - 1.663\,dc + 0.263\,dt \\ \quad + 0.020 \qquad\qquad + 2.009\,da'' + 0.505\,dc + 0.625\,dt \\ \quad + 0.244 - 1.663\,da' + 0.505\,da'' + 19.939\,dc + 1.107\,dt \\ \quad + 0.062 + 0.263\,da' + 0.625\,da'' + 1.107\,dc + 13.836\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = +\overset{s.}{0.078} \\ da'' = -0.007 \\ dc = -0.005 \\ dt = -0.005 \end{array} \\
a'' = +0.537 + da'' \quad \text{“ W.} & & \\
c = +0.352 + dc \quad \text{“ E.} & & \\
\triangle T = +0^h\,15^m\,11^s.528 + dt & &
\end{array}
$$

$a' = +0^s.517$ (circle east); $a'' = +0^s.530$ (circle west); $c = 0^s.347$ (+ with circle east).

Chronometer No. 1295, at $23^h\,27^m.6$ chron. time, $0^h\,15^m\,11^s.522 \pm 0^s.006$ slow, losing $0^s.074$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 14	ο Cephei	E.	7	22 58 51. 529	+0. 554	−0. 120	−0. 968	+0. 999	−0. 034	51. 960	23 14 5. 539	+0 15[13. 579]	. . .
	τ Pegasi		7	22 59 56. 229	+0. 342	−0. 074	−0. 032	+0. 415	−0. 033	56. 847	23 15 10. 264	13. 417	−0. 112
	υ Pegasi		7	23 4 38. 127	+0. 341	−0. 076	−0. 028	+0. 414	−0. 027	38. 751	23 19 52. 052	13. 301	+0. 004
	κ Piscium .		7	23 6 2. 304	+0. 297	−0. 066	+0. 164	+0. 382	−0. 025	3. 056	23 21 16. 290	13. 234	+0. 071
	θ Piscium . .		7	23 7 8. 001	+0. 307	−0. 068	+0. 122	+0. 384	−0. 024	8. 722	23 22 22. 011	12. 289	+0. 016
	70 Pegasi , ...		7	23 8 20. 229	+0. 319	−0. 072	+0. 068	+0. 391	−0. 022	20. 913	23 23 34. 210	13. 297	+0. 008
	72 Pegasi		7	23 13 14. 667	+0. 360	−0. 083	−0. 110	+0. 444	−0. 016	15. 262	23 28 28. 545	13. 283	+0. 022
	γ Cephei	E.	7	23 19 36. 036	+0. 760	−0. 183	−1. 870	+1. 701	−0. 008	36. 436	23 34 49. 281	+0 15[12. 845]	. . .
	41 H. Cephei . .	W.	7	23 27 27. 014	−0. 550	+0. 239	−0. 763	−1. 089	+0. 001	24. 852	23 42 38. 225	+0 15[13. 373]	. . .
	φ Pegasi		7	23 31 39. 716	−0. 332	+0. 150	+0. 010	−0. 445	+0. 006	39. 105	23 46 52. 373	13. 268	+0. 037
	ω Piscium . . .		7	23 38 25. 844	−0. 308	+0. 147	+0. 095	−0. 425	+0. 015	25. 368	23 53 38. 681	13. 313	−0. 008
	33 Piscium		7	23 44 28. 337	−0. 284	+0. 142	+0. 178	−0. 425	+0. 022	27. 970	23 59 41. 231	13. 261	+0. 044
	α Andromedæ .		7	23 47 28. 470	−0. 354	+0. 181	−0. 069	−0. 480	+0. 026	27. 774	0 2 41. 120	13. 346	−0. 041
	γ Pegasi . . .		7	23 52 20. 454	−0. 324	+0. 171	+0. 038	−0. 436	+0. 032	19. 935	0 7 33. 280	13. 345	−0. 040
	44 Piscium . .		7	0 4 31. 917	−0. 299	+0. 172	+0. 127	−0. 422	+0. 047	31. 542	0 19 44. 850	13. 308	−0. 003
	κ Cassiop. . .	W.	7	0 11 32. 921	−0. 500	+0. 302	−0. 585	−0. 909	+0. 056	31. 285	0 26 44. 482	+0 15[13. 197]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{lll}
\text{Assuming } a' = +\overset{s.}{0.478} + da' \text{ circle E.} & \left\{\begin{array}{l} 0 = -0.049 + 2.553\,da' \qquad\qquad\qquad - 2.578\,dc - 0.487\,dt \\ \quad + 0.014 \qquad\qquad + 2.086\,da'' + 1.463\,dc - 0.069\,dt \\ \quad + 0.010 - 2.578\,da' + 1.463\,da'' + 20.317\,dc - 0.213\,dt \\ \quad + 0.005 - 0.487\,da' - 0.069\,da'' - 0.213\,dc + 12.968\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = +\overset{s.}{0.022} \\ da'' = -0.009 \\ dc = +0.003 \\ dt = 0.000 \end{array} \\
a'' = +0.411 + da'' \quad \text{“ W.} & & \\
c = +0.399 + dc \quad \text{“ E.} & & \\
\triangle T = +0^h\,15^m\,13^s.305 + dt. & &
\end{array}
$$

$a' = +0^s.500$ (circle east); $a'' = +0^s.402$ (circle west); $c = 0^s.402$ (+ with circle east).

Chronometer No. 1295, at $23^h\,26^m.5$ chron. time, $0^h\,15^m\,13^s.305 \pm 0^s.009$ slow, losing $0^s.074$ per hour.

Transits of stars observed at St. Nicolas Mole, Hayti, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 15	72 Pegasi . .	E.	7	23 13 12.817	+0.360	+0.074	−0.130	+0.443	−0.039	13.525	23 28 28.523	+0 15 14.998	+0.034
	γ Cephei	.	7	23 19 34.007	+0.760	+0.140	−2.214	+1.697	−0.033	34.357	23 34 49.190	[14.833]	. .
	ω² Aquarii .		7	23 21 43.864	+0.267	+0.047	+0.352	+0.395	−0.031	44.894	23 36 59.820	14.926	+0.106
	41 H. Cephei		7	23 27 22.686	+0.550	+0.087	−1.124	+0.983	−0.025	23.157	23 42 38.178	[15.021]	. .
	φ Pegasi		7	23 31 36.499	+0.332	+0.048	+0.014	+0.402	−0.020	37.275	23 46 52.360	15.085	−0.053
	ω Piscium . . .		7	23 38 22.771	+0.308	+0.038	+0.140	+0.383	−0.013	23.627	23 53 38.670	15.043	−0.011
	33 Piscium . . .		7	23 44 25.230	+0.284	+0.030	+0.263	+0.383	−0.007	26.183	23 59 41.220	15.037	−0.005
	α Andromedæ . .	E.	7	23 47 25.213	+0.354	+0.034	−0.102	+0.434	−0.004	25.929	0 2 41.106	+0 15 15.177	−0.145
	γ Pegasi . .	W.	7	23 52 18.593	−0.324	+0.235	+0.051	−0.435	+0.001	18.121	0 7 33.269	+0 15 15.148	−0.116
	ι Ceti		7	23 58 33.530	−0.278	+0.218	+0.265	−0.427	+0.008	33.316	0 13 48.379	15.063	−0.031
	44 Piscium .		7	0 4 30.019	−0.299	+0.249	+0.170	−0.421	+0.014	29.732	0 19 44.840	15.108	−0.076
	12 Ceti		7	0 9 9.760	−0.288	+0.253	+0.221	−0.422	+0.018	9.542	0 24 24.560	15.018	+0.014
	κ Cassiop. . .		7	0 11 30.964	−0.500	+0.451	−0.778	−0.906	+0.021	29.252	0 26 44.445	[15.193]	. . .
	21 Cassiop.		7	0 23 11.450	−0.679	+0.685	−1.620	−1.564	+0.033	8.305	0 38 23.233	[14.928]	. .
	ξ Andromedæ .		7	0 26 15.267	−0.343	+0.356	−0.039	−0.460	+0.036	14.817	0 41 29.640	14.823	+0.209
	δ Piscium . . .	W.	7	0 27 42.953	−0.309	+0.325	+0.119	−0.424	+0.038	42.702	0 42 57.659	+0 15 14.957	+0.075

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +0^s.641 + da' \text{ circle E.} & 0 = +0.137 + 2.983\,da' \qquad\qquad - 2.022\,dc + 0.047\,dt & \text{whence } da' = -0^s.049 \\
& a'' = +0.482 + da'' \text{ " W.} & \quad -0.131 \qquad\qquad + 2.571\,da'' + 1.153\,dc + 0.546\,dt & da'' = +0.053 \\
& c = +0.405 + dc \text{ " E.} & \quad -0.085 - 2.022\,da' + 1.153\,da'' + 20.334\,dc + 0.094\,dt & dc = -0.004 \\
& \Delta T = +0^h\,15^m\,15^s.035 + dt & \quad -0.008 + 0.047\,da' + 0.546\,da'' + 0.094\,dc + 12.848\,dt & dt = -0.001
\end{array}
$$

$a' = +0^s.592$ (circle east); $a'' = +0^s.535$ (circle west); $c = 0^s.401$ (+ with circle east).

Chronometer No. 1295, at $23^h\,51^m.3$ chron. time, $0^h\,15^m\,15^s.032 \pm 0^s.019$ slow, losing $0^s.062$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 16	ω Piscium .	E.	7	23 38 21.519	+0.308	−0.186	+0.103	+0.441	−0.088	22.097	23 53 38.659	+0 15 16.562	−0.057
	33 Piscium . .		7	23 44 24.013	+0.284	−0.171	+0.194	+0.441	−0.081	24.680	23 59 41.209	16.529	−0.024
	α Andromedæ .		7	23 47 24.071	+0.354	−0.212	−0.075	+0.498	−0.077	24.559	0 2 41.092	16.533	−0.028
	γ Pegasi . .	.	7	23 52 16.200	+0.324	−0.193	+0.042	+0.452	−0.071	16.754	0 7 33.258	16.504	+0.001
	ι Ceti	.	7	23 58 31.176	+0.278	−0.165	+0.217	+0.444	−0.063	31.887	0 13 48.368	16.481	+0.024
	44 Piscium . .		7	0 4 27.774	+0.299	−0.177	+0.139	+0.438	−0.056	28.417	0 19 44.831	16.414	+0.091
	κ Cassiop. .	.	7	0 11 27.507	+0.500	−0.295	−0.636	+0.943	−0.047	27.972	0 26 44.409	[16.437]	.
	γ Cassiop. . .	E.	7	0 34 46.771	+0.483	−0.285	−0.568	+0.880	−0.018	47.263	0 50 3.797	+0 15[16.534]	. .
	44 Cephei, H. . .	W.	6	0 47 35.526	−0.850	0.000	−0.677	−2.526	−0.002	31.471	1 2 48.157	+0 15[16.686]	. .
	ι Piscium	.	7	0 50 19.877	−0.357	+0.012	−0.029	−0.549	+0.002	18.956	1 5 35.459	16.503	+0.002
	υ Piscium	.	7	0 58 8.889	−0.350	+0.048	−0.020	−0.535	+0.011	8.043	1 13 24.558	16.515	−0.010
	55 Cassiop. . .	.	7	1 50 37.107	−0.536	+0.014	−0.265	−1.176	+0.077	35.221	2 5 51.575	[16.354]	. .
	ξ¹ Ceti		7	1 51 53.911	−0.312	+0.010	+0.030	−0.483	+0.079	53.235	2 7 9.778	16.543	−0.038
	67 Ceti		7	1 56 13.547	−0.283	+0.025	+0.067	−0.481	+0.084	12.959	2 11 29.436	16.477	+0.028
	ο Ceti		7	1 58 31.139	−0.290	+0.033	+0.059	−0.479	+0.087	30.549	2 13 46.988	16.439	+0.066
	ξ² Ceti . .	W.	7	2 7 2.336	−0.312	+0.067	+0.031	−0.483	+0.098	1.737	2 22 18.297	+0 15 16.560	−0.055

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +0^s.459 + da' \text{ circle E.} & 0 = +0.054 + 2.061\,da' \qquad\qquad - 0.744\,dc + 0.382\,dt & \text{whence } da' = -0^s.022 \\
& a'' = +0.135 + da'' \text{ " W.} & \quad -0.057 \qquad\qquad + 2.760\,da'' + 1.932\,dc + 0.127\,dt & da'' = +0.014 \\
& c = +0.449 + dc \text{ " E.} & \quad -0.224 - 0.744\,da' + 1.932\,da'' + 19.858\,dc + 0.414\,dt & dc = +0.009 \\
& \Delta T = +0^h\,15^m\,16^s.503 + dt. & \quad +0.021 + 0.382\,da' + 0.127\,da'' + 0.414\,dc + 13.103\,dt & dt = -0.001
\end{array}
$$

$a' = +0^s.437$ (circle east); $a'' = +0^s.149$ (circle west); $c = 0^s.458$ (+ with circle east).

Chronometer No. 1295, at $0^h\,49^m.0$ chron. time, $0^h\,15^m\,16^s.505 \pm 0^s.009$ slow, losing $0^s.075$ per hour.

Transits of stars observed at St. Nicolas Mole, Hayti, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
1889. Dec. 17	ω^2 Aquarii	E.	7	23 21 40.540	+0.267	−0.136	+0.220	+0.462	−0.080	41.273	23 36 59.797	+0 15 18.524	+0.087
	41 H. Cephei		7	23 27 19.057	+0.550	−0.292	−0.703	+1.151	−0.072	19.691	23 42 38.082	[18.391]	
	φ Pegasi		7	23 31 33.136	+0.332	−0.183	+0.009	+0.470	−0.066	33.698	23 46 52.336	18.638	−0.027
	ω Piscium		7	23 38 19.419	+0.308	−0.178	+0.087	+0.449	−0.057	20.028	23 53 38.648	18.620	−0.009
	33 Piscium		7	23 44 21.937	+0.284	−0.172	+0.164	+0.449	−0.048	22.614	23 59 41.198	18.584	+0.027
	α Andromedæ		7	23 47 21.889	+0.354	−0.219	−0.064	+0.508	−0.044	22.424	0 2 41.078	18.654	−0.043
	γ Pegasi		7	23 52 14.007	+0.324	−0.208	+0.035	+0.461	−0.037	14.582	0 7 33.247	18.665	−0.054
	κ Cassiop.	E.	7	0 11 25.121	+0.500	−0.362	−0.538	+0.960	−0.009	25.672	0 26 44.372	+0 15[18.700]	. . .
	21 Cassiop.	W.	7	0 23 7.893	−0.679	−0.082	−0.566	−1.806	+0.008	4.768	0 38 23.099	+0 15[18.331]	. . .
	ζ Andromedæ		7	0 26 11.940	−0.343	−0.033	−0.014	−0.531	+0.012	11.031	0 41 29.617	18.586	+0.025
	δ Piscium		7	0 27 39.819	−0.309	−0.026	+0.042	−0.489	+0.014	39.051	0 42 57.637	18.586	+0.025
	43 Cephei, H.		6	0 38 42.580	−1.706	−0.022	−2.259	−6.437	+0.030	32.186	0 53 51.528	[19.342]	
	f Piscium		7	0 56 48.969	−0.302	−0.022	+0.054	−0.486	+0.056	48.269	1 12 6.776	18.507	+0.104
	η Piscium		7	1 10 17.330	−0.324	−0.038	+0.017	−0.503	+0.075	16.557	1 25 35.201	18.644	−0.033
	π Piscium		7	1 15 57.529	−0.318	−0.041	+0.027	−0.496	+0.083	56.784	1 31 15.404	18.620	−0.009
	ν Piscium	W.	7	1 20 23.851	−0.306	−0.045	+0.048	−0.488	+0.090	23.150	1 35 41.855	+0 15 18.705	−0.094

NORMAL EQUATIONS.

$$\text{Assuming}\quad \begin{aligned} a' &= +\overset{s.}{0.382} + da' \text{ circle E.} \\ a'' &= +0.163 + da'' \quad \text{“ W.} \\ c &= +0.456 + dc \quad \text{“ E.} \\ \triangle T &= +0^h\,15^m\,18^s.612 + dt. \end{aligned} \quad \left\{ \begin{aligned} 0 &= +0.040 + 2.339\,da' - 1.165\,dc + 0.208\,dt \\ & \; -0.102 + 3.224\,da'' + 2.503\,dc + 0.380\,dt \\ & \; -0.278 - 1.165\,da' + 2.503\,da'' + 20.250\,dc + 0.891\,dt \\ & \; +0.052 + 0.208\,da' + 0.380\,da'' + 0.891\,dc + 12.763\,dt \end{aligned} \right\} \quad \text{whence} \begin{aligned} da' &= -\overset{s.}{0.012} \\ da'' &= +0.024 \\ dc &= +0.010 \\ dt &= -0.005 \end{aligned}$$

$a' = +0^s.370$ (circle east); $a'' = +0^s.187$ (circle west); $c = 0^s.466$ (+ with circle east).

Chronometer No. 1295, at $0^h\,17^m.8$ chron. time, $0^h\,15^m\,18^s.611 \pm 0^s.011$ slow, losing $0^s.086$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 18	γ Cephei	E.	7	23 19 28.321	+0.760	−0.311	−1.840	+1.759	−0.042	28.647	23 34 48.918	+0 15[20.271]	. .
	ω^2 Aquarii		7	23 21 38.681	+0.267	−0.115	+0.292	+0.409	−0.040	39.494	23 36 59.786	20.292	+0.022
	i' Aquarii		7	23 23 7.496	+0.260	−0.119	+0.325	+0.418	−0.038	8.342	23 38 28.513	20.171	+0.143
	41 H. Cephei		7	23 27 17.529	+0.550	−0.280	−0.934	+1.019	−0.033	17.851	23 42 38.034	[20.183]	. . .
	φ Pegasi		7	23 31 31.399	+0.332	−0.184	+0.012	+0.417	−0.029	31.947	23 46 52.324	20.377	−0.063
	ω Piscium		7	23 38 17.647	+0.308	−0.186	+0.116	+0.397	−0.021	18.261	23 53 38.637	20.376	−0.062
	33 Piscium		7	23 44 20.153	+0.284	−0.175	+0.218	+0.397	−0.014	20.863	23 59 41.187	20.324	−0.010
	γ Pegasi	E.	3	23 52 12.258	+0.324	−0.196	+0.047	+0.408	−0.006	12.835	0 7 33.236	+0 15 20.401	−0.087
	ι Ceti	W.	7	23 58 28.693	−0.278	0.000	+0.110	−0.441	+0.001	28.085	0 13 48.343	+0 15 20.258	+0.056
	44 Piscium		7	0 4 25.154	−0.299	+0.002	+0.070	−0.435	+0.008	24.500	0 19 44.811	20.311	+0.003
	κ Cassiop.		7	0 11 25.650	−0.500	+0.006	−0.323	−0.937	+0.016	23.912	0 26 44.335	[20.423]	. . .
	ε Andromedæ		7	0 17 24.241	−0.355	+0.007	−0.039	−0.496	+0.023	23.381	0 32 43.677	20.296	+0.018
	ζ Andromedæ		7	0 26 10.113	−0.343	+0.010	−0.016	−0.475	+0.032	9.321	0 41 29.605	20.284	+0.030
	δ Piscium		7	0 27 37.939	−0.309	+0.010	+0.050	−0.438	+0.034	37.286	0 42 57.626	20.340	−0.026
	ε Piscium		7	0 41 53.554	−0.310	+0.013	+0.049	−0.438	+0.050	52.918	0 57 13.261	20.343	−0.029
	44 Cephei, H.	W.	6	0 47 31.943	−0.850	+0.040	−1.009	−2.299	+0.056	27.881	1 2 47.964	+0 15[20.083]	. . .

NORMAL EQUATIONS.

$$\text{Assuming}\quad \begin{aligned} a' &= +\overset{s.}{0.532} + da' \text{ circle E.} \\ a'' &= +0.164 + da'' \quad \text{“ W.} \\ c &= +0.402 + dc \quad \text{“ E.} \\ \triangle T &= +0^h\,15^m\,20^s.312 + dt. \end{aligned} \quad \left\{ \begin{aligned} 0 &= +0.141 + 3.351\,da' - 0.773\,dc + 1.195\,dt \\ & \; -0.174 + 2.595\,da'' + 1.713\,dc + 0.188\,dt \\ & \; -0.390 - 0.773\,da' + 1.713\,da'' + 20.092\,dc - 0.076\,dt \\ & \; +0.023 + 1.195\,da' + 0.188\,da'' - 0.076\,dc + 12.779\,dt \end{aligned} \right\} \quad \text{whence} \begin{aligned} da' &= -\overset{s.}{0.040} \\ da'' &= +0.058 \\ dc &= +0.013 \\ dt &= +0.001 \end{aligned}$$

$a' = +0^s.492$ (circle east); $a'' = +0^s.222$ (circle west); $c = 0^s.415$ (+ with circle east).

Chronometer No. 1295, at $23^h\,57^m.2$ chron. time, $0^h\,15^m\,20^s.314 \pm 0^s.012$ slow, losing $0^s.067$ per hour.

Transits of stars observed at St. Nicolas Mole, Hayti, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 19	φ Pegasi . . .	E.	7	23 31 29.786	+0.332	−0.069	+0.008	+0.435	−0.054	30.438	23 46 52.312	+0 15 21.874	+0.013
	ω Piscium . .		7	23 38 16.094	+0.308	−0.076	+0.080	+0.414	−0.047	16.773	23 53 38.626	21.853	+0.034
	33 Piscium	.	7	23 44 18.570	+0.284	−0.080	+0.151	+0.414	−0.040	19.299	23 59 41.176	21.877	+0.010
	α Andromedæ . .		7	23 47 18.537	+0.354	−0.106	−0.058	+0.469	−0.037	19.159	0 2 41.050	21.891	−0.004
	γ Pegasi		7	23 52 10.699	+0.324	−0.107	+0.032	+0.426	−0.031	11.343	0 7 33.225	21.882	+0.005
	ι Ceti	.	7	23 58 25.669	+0.278	−0.102	+0.169	+0.418	−0.025	26.407	0 13 48.331	21.924	−0.037
	44 Piscium		7	0 4 22.190	+0.299	0.119	+0.108	+0.412	−0.018	22.872	0 19 44.801	21.929	−0.042
	12 Ceti		7	0 9 1.944	+0.288	−0.123	+0.141	+0.413	−0.013	2.650	0 24 24.521	21.871	+0.016
	κ Cassiop.		7	0 11 21.593	+0.500	−0.222	−0.495	+0.887	−0.010	22.253	0 26 44.298	[22.045]	. .
	21 Cassiop.	E.	7	0 23 0.429	+0.679	−0.351	−1.030	+1.531	+0.002	1.260	0 38 22.964	+0 15[21.704]	
	γ Cassiop. . .	W.	7	0 34 43.393	−0.483	+0.058	−0.392	−0.908	+0.015	41.683	0 50 3.701	+0 15[22.018]	.
	ε Piscium		7	0 41 51.960	−0.310	+0.049	+0.066	−0.456	+0.023	51.332	0 57 13.251	21.919	−0.032
	44 Cephei, H. . .		7	0 47 30.607	−0.850	+0.159	−1.372	−2.388	+0.029	26.185	1 2 47.867	[21.682]	.
	f Piscium . . .		7	0 56 45.426	−0.302	+0.070	+0.087	−0.452	+0.040	44.869	1 12 6.754	21.885	+0.002
	υ Piscium . . .		7	0 58 3.390	−0.350	+0.083	−0.040	−0.506	+0.041	2.618	1 13 24.523	21.905	−0.018
	θ^1 Ceti		7	1 3 9.406	−0.280	+0.074	+0.146	−0.457	+0.047	8.936	1 18 30.841	21.905	−0.018
	η Piscium . . .		7	1 10 13.956	−0.324	+0.097	+0.027	−0.467	+0.054	13.343	1 25 35.181	21.838	+0.049
	π Piscium	W.	7	1 15 54.091	−0.318	+0.104	+0.044	−0.461	+0.061	53.521	1 31 15.386	+0 15 21.865	+0.022

NORMAL EQUATIONS.

$$\text{Assuming}\quad \begin{array}{ll} a' = +\overset{s.}{0.344} + da' & \text{circle E.} \\ a'' = +0.264 + da'' & \text{“ W.} \\ c = +0.428 + dc & \text{“ E.} \\ \triangle T = +0^h\,15^m\,21^s.890 + dt. & \end{array} \left\{ \begin{array}{l} 0 = +0.013 + 2.800\,da' \qquad\qquad - 0.785\,dc + 0.928\,dt \\ \quad -0.104 \qquad\qquad + 2.529\,da'' + 1.626\,dc + 0.260\,dt \\ \quad -0.160 - 0.785\,da' + 1.626\,da'' + 22.006\,dc + 2.157\,dt \\ \quad -0.041 + 0.928\,da' + 0.260\,da'' + 2.157\,dc + 14.958\,dt \end{array} \right\} \begin{array}{ll} \text{whence } da' & = -\overset{s.}{0.004} \\ da'' & = +0.038 \\ dc & = +0.004 \\ dt & = +0.002 \end{array}$$

$a' = +0^s.340$ (circle east); $a'' = +0^s.302$ (circle west); $c = 0^s.432$ (+ with circle east).

Chronometer No. 1295, at $0^h\,20^m.8$ chron. time, $0^h\,15^m\,21^s.887 \pm 0^s.005$ slow, losing $0^s.066$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 20	γ Cassiop. . .	W.	7	0 34 40.864	−0.483	+0.175	−0.130	−0.231	−0.048	40.147	0 50 3.669	+0 15[23.522]	.
	ε Piscium		7	0 41 49.914	−0.310	+0.119	+0.022	−0.116	−0.040	49.589	0 57 13.241	23.652	−0.064
	44 Cephei, H. . .		7	0 47 25.664	−0.850	+0.351	−0.454	−0.608	−0.033	24.070	1 2 47.768	[23.698]	.
	τ Piscium . . .		7	0 50 12.273	−0.357	+0.149	−0.019	−0.132	−0.030	11.884	1 5 35.404	23.520	+0.068
	f Piscium . . .		7	0 56 43.430	−0.302	+0.134	+0.029	−0.115	−0.022	43.154	1 12 6.743	23.589	−0.001
	υ Piscium		7	0 58 1.243	−0.350	+0.157	−0.013	−0.129	−0.020	0.888	1 13 24.511	23.623	−0.035
	θ^1 Ceti		7	1 3 7.531	−0.280	+0.131	+0.048	−0.116	−0.014	7.300	1 18 30.831	23.531	+0.057
	η Piscium . .	W.	7	1 10 11.833	−0.324	+0.161	+0.009	−0.119	−0.006	11.554	1 25 35.171	+0 15 23.617	−0.029
	π Piscium	E.	7	1 15 51.477	+0.318	−0.019	+0.035	+0.077	+0.001	51.889	1 31 15.377	+0 15 23.488	+0.100
	43 Cassiop. . .	.	7	1 18 48.100	+0.554	−0.054	−0.459	+0.196	+0.005	48.342	1 34 11.871	[23.529]	.
	ο Piscium . . .		7	1 24 10.600	+0.312	−0.050	+0.047	+0.076	+0.011	10.996	1 39 34.517	23.521	+0.067
	ζ Ceti		7	1 30 37.336	+0.276	−0.064	+0.124	+0.076	+0.019	37.761	1 46 1.371	23.604	−0.016
	γ Arietis . . .		7	1 32 5.126	+0.333	−0.084	+0.005	+0.079	+0.020	5.479	1 47 29.082	23.603	−0.015
	50 Cassiop.		7	1 38 39.571	+0.623	−0.204	−0.604	+0.241	+0.028	39.655	1 54 3.276	[23.621]	
	α Arietis		7	1 45 33.894	+0.341	−0.141	−0.014	+0.081	+0.037	34.198	2 0 57.874	23.676	−0.088
	ξ^1 Ceti	E.	7	1 51 45.790	+0.312	−0.151	+0.048	+0.076	+0.044	46.119	2 7 9.752	+0 15 23.633	−0.045

NORMAL EQUATIONS.

$$\text{Assuming}\quad \begin{array}{ll} a' = +\overset{s.}{0.100} + da' & \text{circle W.} \\ a'' = +0.247 + da'' & \text{“ E.} \\ c = +0.083 + dc & \text{“ E.} \\ \triangle T = +0^h\,15^m\,23^s.587 + dt. & \end{array} \left\{ \begin{array}{l} 0 = -0.023 + 2.545\,da' \qquad\qquad + 1.997\,dc - 0.079\,dt \\ \quad +0.044 \qquad\qquad + 2.459\,da'' - 1.692\,dc + 0.082\,dt \\ \quad -0.258 + 1.997\,da' - 1.692\,da'' + 20.226\,dc - 0.054\,dt \\ \quad +0.013 - 0.079\,da' + 0.082\,da'' - 0.054\,dc + 12.900\,dt \end{array} \right\} \begin{array}{ll} \text{whence } da' & = \overset{s.}{0.000} \\ da'' & = -0.009 \\ dc & = +0.012 \\ dt & = -0.001 \end{array}$$

$a' = +0^s.100$ (circle west); $a'' = +0^s.238$ (circle east); $c = 0^s.095$ (+ with circle east).

Chronometer No. 1295, at $1^h\,15^m.0$ chron. time, $0^h\,15^m\,23^s.588 \pm 0^s.012$ slow, losing $0^s.072$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 1	γ Ceti	E.	7	2 7 54.446	+0.304	+0.037	−0.033	+0.305	−0.039	55.020	2 37 35.654	+0 29 40.634	−0.057
	π Ceti	.	7	2 9 11.869	+0.273	+0.038	−0.069	+0.315	−0.039	12.387	2 38 52.946	40.559	+0.018
	σ Arietis		7	2 15 43.536	+0.325	+0.078	−0.009	+0.315	−0.035	44.210	2 45 24.805	40.595	−0.018
	47 Cephei, H.		7	2 21 46.986	+0.811	+0.273	+0.565	+1.596	−0.032	50.199	2 51 30.657	[40.458]	. . .
	9 H. Camelop.		7	3 18 3.900	+0.477	+0.185	+0.171	+0.625	−0.002	5.356	3 47 45.992	[40.636]	. . .
	γ Eridani		7	3 23 12.789	+0.274	+0.104	−0.068	+0.314	+0.001	13.414	3 52 53.978	40.564	+0.013
	λ Tauri	.	7	3 24 53.806	+0.320	+0.121	−0.014	+0.312	+0.002	54.547	3 54 35.086	40.539	+0.038
	ν Tauri	E.	7	3 27 36.987	+0.309	+0.116	−0.027	+0.307	+0.003	37.695	3 57 18.266	+0 29 40.571	+0.006
	γ Tauri	W.	7	3 43 51.937	−0.326	+0.114	−0.009	−0.358	+0.012	51.370	4 13 32.018	+0 29 40.648	−0.071
	δ Tauri	.	7	3 46 55.366	−0.330	+0.149	−0.003	−0.361	+0.014	54.835	4 16 35.459	40.624	−0.047
	ε Tauri		7	3 52 31.500	0.333	+0.211	+0.001	−0.365	+0.016	31.030	4 22 11.621	40.591	−0.014
	α Tauri		7	3 59 56.476	0.328	+0.269	−0.006	−0.359	+0.020	56.072	4 29 36.576	40.504	+0.073
	ν Eridani		6	4 1 9.333	−0.293	+0.245	−0.058	−0.346	+0.021	8.902	4 30 49.459	40.557	+0.020
	τ Tauri	.	7	4 5 58.474	−0.341	+0.308	+0.012	−0.374	+0.024	58.103	4 35 38.639	40.536	+0.041
	α Camelop.		6	4 13 27.823	−0.524	+0.500	+0.280	−0.854	+0.028	27.253	4 43 7.823	[40.570]	. . .
	10 Camelop.	W.	7	4 23 58.714	−0.473	+0.434	+0.206	−0.696	+0.033	58.218	4 53 38.798	+0 29[40.580]	. .

NORMAL EQUATIONS.

Assuming
$$\begin{aligned} a' &= -0^s.119 + da' \text{ circle E.} \\ a'' &= -0.148 + da'' \quad \text{"} \quad \text{W.} \\ c &= +0.323 + dc \quad \text{"} \quad \text{E.} \\ \Delta T &= +0^h\, 29^m\, 40^s.576 + dt. \end{aligned} \left\{ \begin{aligned} 0 &= +0.015 + 2.655\, da' \qquad\qquad\quad - 0.959\, dc + 0.925\, dt \\ &\ +0.006 \qquad\qquad + 1.755\, da'' + 1.868\, dc - 0.611\, dt \\ &\ -0.038 - 0.959\, da' + 1.868\, da'' + 19.595\, dc - 0.438\, dt \\ &\ -0.020 + 0.925\, da' - 0.611\, da'' - 0.438\, dc + 13.115\, dt \end{aligned} \right\} \text{whence } \begin{aligned} da' &= -0^s.005 \\ da'' &= -0.005 \\ dc &= +0.002 \\ dt &= +0.002 \end{aligned}$$

$a' = -0^s.124$ (circle east); $a'' = -0^s.153$ (circle west); $c = 0^s.325$ (+ with circle east).

Chronometer No. 1295, at $3^h\, 21^m.6$ chron. time, $0^h\, 29^m\, 40^s.577 \pm 0^s.008$ slow, losing $0^s.032$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 2	ν Tauri	E.	7	3 27 36.036	+0.309	−0.004	+0.008	+0.366	−0.037	36.678	3 57 18.262	+0 29 41.584	+0.020
	o¹ Eridani	.	7	3 36 47.679	+0.286	−0.013	+0.017	+0.367	−0.029	48.307	4 6 29.849	41.542	+0.062
	γ Tauri		7	3 43 49.703	+0.326	−0.022	+0.002	+0.377	−0.024	50.362	4 13 32.016	41.654	−0.050
	δ Tauri	.	7	3 46 53.223	+0.330	−0.025	+0.001	+0.381	−0.021	53.889	4 16 35.458	41.569	+0.035
	ε Tauri		7	3 52 29.284	+0.333	−0.033	0.000	+0.385	−0.016	29.953	4 22 11.620	41.667	−0.063
	α Tauri		7	3 59 54.263	+0.328	−0.041	+0.002	+0.379	−0.010	54.921	4 29 36.574	41.653	−0.049
	Gr. 848		7	4 4 20.721	+0.692	−0.094	−0.130	+1.478	−0.007	22.660	4 34 4.510	[41.850]	. .
	α Camelop.	E.	7	4 13 25.179	+0.524	−0.088	−0.069	+0.900	+0.001	26.447	4 43 7.813	+0 29[41.366]	. . .
	10 Camelop.	W.	7	4 23 58.057	−0.473	−0.126	+0.433	−0.815	+0.009	57.085	4 53 38.794	+0 29[41.709]	. . .
	ι Tauri		7	4 26 50.610	−0.338	−0.085	+0.018	−0.434	+0.012	49.783	4 56 31.361	41.578	+0.026
	11 Orionis		7	4 28 36.417	−0.326	−0.079	−0.019	−0.419	+0.013	35.587	4 58 17.124	41.537	+0.067
	19 H. Camelop.		7	4 34 49.586	−0.816	−0.171	+1.486	−2.138	+0.018	47.965	5 4 29.473	[41.508]	. . .
	β Orionis		7	39 34.684	−0.284	−0.052	−0.147	−0.408	+0.022	33.815	5 9 15.391	41.576	+0.028
	τ Orionis		7	4 42 35.366	−0.286	−0.048	−0.139	−0.407	+0.024	34.510	5 12 16.214	41.704	−0.100
	γ Orionis		7	4 49 33.273	−0.310	−0.041	−0.068	−0.406	+0.030	32.478	5 19 14.050	41.572	+0.032
	δ Orionis	W.	7	4 56 42.676	−0.298	−0.028	−0.104	−0.404	+0.036	41.878	5 26 23.486	+0 29 41.608	−0.004

NORMAL EQUATIONS.

Assuming
$$\begin{aligned} a' &= +0^s.069 + da' \text{ circle E.} \\ a'' &= -0.351 + da'' \quad \text{"} \quad \text{W.} \\ c &= +0.402 + dc \quad \text{"} \quad \text{E.} \\ \Delta T &= +0^h\, 29^m\, 41^s.605 + dt. \end{aligned} \left\{ \begin{aligned} 0 &= +0.041 + 2.530\, da' \qquad\qquad\quad - 2.101\, dc - 0.144\, dt \\ &\ -0.055 \qquad\qquad + 2.753\, da'' + 1.346\, dc + 0.572\, dt \\ &\ +0.246 - 2.101\, da' + 1.346\, da'' + 19.863\, dc + 0.061\, dt \\ &\ +0.002 - 0.144\, da' + 0.572\, da'' + 0.061\, dc + 12.860\, dt \end{aligned} \right\} \text{whence } \begin{aligned} da' &= -0^s.031 \\ da'' &= +0.029 \\ dc &= -0.018 \\ dt &= -0.002 \end{aligned}$$

$a' = +0^s.038$ (circle east); $a'' = -0^s.322$ (circle west); $c = 0^s.384$ (+ with circle east).

Chronometer No. 1295, at $4^h\, 12^m.6$ chron. time, $0^h\, 29^m\, 41^s.604 \pm 0^s.010$ slow, losing $0^s.049$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 3	γ Ceti	E.	7	2 7 52.293	+0.304	+0.004	+0.009	+0.292	−0.069	52.833	2 37 35.638	+0 29 42.805	+0.024
	π Ceti	.	7	2 9 9.640	+0.273	+0.005	+0.018	+0.301	−0.068	10.169	2 38 52.923	42.754	+0.075
	σ Arietis		7	2 15 41.396	+0.325	+0.015	+0.002	+0.302	−0.063	41.977	2 45 24.789	42.812	+0.017
	47 Cephei, H.	.	7	2 21 45.600	+0.811	+0.059	−0.150	+1.528	−0.059	47.789	2 51 30.500	[42.711]	. .
	α Ceti	.	7	2 26 48.034	+0.305	+0.029	+0.008	+0.293	−0.055	48.614	2 56 31.446	42.832	−0.003
	δ Tauri	.	6	3 46 51.884	+0.330	+0.028	+0.001	+0.306	+0.006	52.555	4 16 35.456	42.901	−0.072
	ε Tauri		7	3 52 28.120	+0.333	0.000	0.000	+0.309	+0.011	28.773	4 22 11.619	42.846	−0.017
	α Tauri		7	3 59 53.071	+0.328	−0.034	+0.001	+0.304	+0.016	53.686	4 29 36.571	42.885	−0.056
	Gr. 848	E.	7	4 4 20.001	+0.692	−0.116	−0.113	+1.186	+0.020	21.670	4 34 4.485	+0 29[42.815]	. .
	i Tauri	W.	7	4 15 14.021	−0.332	+0.172	0.000	−0.350	+0.028	13.539	4 44 56.441	+0.29 42.902	−0.073
	π⁵ Orionis		7	4 18 49.051	−0.303	+0.181	−0.011	−0.332	+0.031	48.617	4 48 31.462	42.845	−0.016
	10 Camelop.		7	4 23 56.593	−0.473	+0.331	+0.054	−0.670	+0.035	55.870	4 53 38.791	[42.921]	.
	ι Tauri		7	4 26 48.961	−0.338	+0.258	+0.002	−0.357	+0.037	48.563	4 56 31.361	42.798	+0.031
	11 Orionis	.	7	4 28 34.704	−0.326	+0.261	−0.002	−0.344	+0.038	34.331	4 58 17.125	42.794	+0.035
	β Eridani	.	7	4 32 44.334	−0.290	+0.256	−0.016	−0.333	+0.042	43.993	5 2 26.771	42.778	+0.051
	19 H. Camelop.	.	7	4 34 48.414	−0.816	+0.754	+0.184	−1.757	+0.043	46.822	5 4 29.452	[42.630]	
	β Orionis	W.	7	4 39 32.859	−0.284	+0.292	−0.018	−0.336	+0.047	32.560	5 9 15.391	+0 29 42.831	−0.002

NORMAL EQUATIONS.

Assuming
$a' = +0^s.069 + da'$ circle E.
$a'' = -0.051 + da''$ " W.
$c = +0.313 + dc$ " E.
$\triangle T = +0^h 29^m 42^s.827 + dt.$

$$\left\{\begin{array}{l} 0 = +0.115 + 3.281\,da' \qquad\qquad\qquad - 2.069\,dc + 0.485\,dt \\ \quad -0.029 \qquad\qquad + 2.658\,da'' + 1.635\,dc + 0.285\,dt \\ \quad -0.080 - 2.069\,da' + 1.635\,da'' + 21.230\,dc + 0.712\,dt \\ \quad -0.029 + 0.488\,da' + 0.285\,da'' + 0.712\,dc + 13.651\,dt \end{array}\right\}$$

whence $da' = -0^s.036$, $da'' = +0.011$, $dc = -0.001$, $dt = +0.003$

$a' = +0^s.033$ (circle east); $a'' = -0^s.040$ (circle west); $c = 0^s.312$ (+ with circle east).

Chronometer No. 1295, at $3^h\ 38^m.5$ chron. time, $0^h\ 29^m\ 42^s.829 \pm 0^s.009$ slow, losing $0^s.046$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 4	σ Arietis	E.	7	2 15 40.091	+0.325	+0.106	+0.006	+0.344	−0.070	40.802	2 45 24.781	+0 29 43.979	−0.173
	47 Cephei, H.	.	7	2 21 44.029	+0.811	+0.368	−0.405	+1.743	−0.065	46.481	2 51 30.419	[43.938]	.
	α Ceti		7	2 26 46.890	+0.305	+0.184	+0.023	+0.334	−0.060	47.676	2 56 31.437	43.761	+0.045
	δ Arietis	.	7	2 35 35.356	+0.334	+0.273	−0.001	+0.353	−0.053	36.262	3 5 20.015	43.753	+0.053
	ζ Arietis	.	7	2 38 49.769	+0.336	+0.301	−0.004	+0.356	−0.050	50.708	3 8 34.435	43.727	+0.079
	γ Tauri	.	7	3 43 47.389	+0.326	+0.102	+0.005	+0.345	+0.004	48.171	4 13 32.011	43.840	−0.034
	δ Tauri		7	3 46 50.827	+0.330	+0.105	+0.002	+0.349	+0.006	51.619	4 16 35.454	43.835	−0.029
	ε Tauri	.	7	3 52 27.046	+0.333	+0.111	−0.001	+0.352	+0.011	27.852	4 22 11.618	43.766	+0.040
	Gr. 848	E.	7	4 4 18 729	+0.692	+0.250	−0.304	+1.352	+0.021	20.740	4 34 4.458	+0 29[43.718]	. . .
	μ Eridani	W.	7	4 10 16.834	−0.293	+0.290	−0.021	−0.374	+0.026	16.462	4 40 0.279	+0 29 43.817	−0.011
	α Camelop.		7	4 13 24.857	−0.524	+0.539	+0.102	−0.923	+0.028	24.079	4 43 7.791	[43.712]	. .
	π⁴ Orionis	.	7	4 15 37.540	−0.308	+0.326	−0.013	−0.374	+0.030	37.201	4 45 20.964	43.763	+0.043
	π⁵ Orionis		7	4 18 47.900	−0.303	+0.332	−0.016	−0.373	+0.033	47.573	4 48 31.462	43.889	−0.083
	10 Camelop.		7	4 23 55.421	−0.473	+0.549	+0.075	−0.752	+0.037	54.857	4 53 38.786	[43.929]	. . .
	ι Tauri	.	7	4 26 47.889	−0.338	+0.403	+0.003	−0.401	+0.040	47.596	4 56 31.361	43.765	+0.041
	11 Orionis		7	4 28 33.610	−0.326	+0.396	−0.003	−0.386	+0.041	33.332	4 58 17.125	43.793	+0.013
	β Eridani	W.	7	4 32 43.253	−0.290	+0.367	−0.023	−0.374	+0.044	42.977	5 2 26.771	+0 29 43.794	+0.012

NORMAL EQUATIONS.

Assuming
$a' = +0^s.081 + da'$ circle E.
$a'' = -0.064 + da''$ " W.
$c = +0.361 + dc$ " E.
$\triangle T = +0^h 29^m 43^s.807 + dt$

$$\left\{\begin{array}{l} 0 = -0.044 + 2.900\,da' \qquad\qquad\qquad - 2.959\,dc - 0.380\,dt \\ \quad -0.008 \qquad\qquad + 2.088\,da'' + 1.047\,dc + 0.244\,dt \\ \quad +0.175 - 2.959\,da' + 1.047\,da'' + 21.050\,dc + 0.540\,dt \\ \quad -0.006 - 0.380\,da' + 0.244\,da'' + 0.540\,dc + 13.861\,dt \end{array}\right\}$$

whence $da' = +0^s.008$, $da'' = +0.008$, $dc = -0.008$, $dt = +0.001$

$a' = +0^s.089$ (circle east); $a'' = -0^s.056$ (circle west); $c = 0^s.353$ (+ with circle east).

Chronometer No. 1295, at $3^h\ 39^m.4$ chron. time, $0^h\ 29^m\ 43^s.806 \pm 0^s.013$ slow, losing $0^s.050$ per hour.

Transits of stars observed at Santo Domingo City by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 5.	ψ Cassiop.	E.	7	0 48 23.343	+0.540	−0.293	−0.166	+0.752	−0.068	24.108	1 18 9.161	+0 29[45.053]	. . .
	π Piscium		7	1 1 29.651	+0.319	−0.203	+0.010	+0.293	−0.054	30.016	1 31 15.208	45.192	+0.064
	υ Ceti		5	1 25 3.200	+0.259	−0.207	+0.058	+0.309	−0.029	3.590	1 54 48.754	45.164	+0.092
	α Arietis		7	1 31 12.031	+0.341	−0.288	−0.007	+0.312	−0.022	12.367	2 0 57.710	45.343	−0.087
	55 Cassiop.		7	1 36 4.964	+0.523	−0.460	−0.152	+0.706	−0.017	5.564	2 5 50.902	[45.338]	. . .
	ξ¹ Ceti		7	1 37 23.963	+0.313	−0.278	+0.015	+0.290	−0.016	24.287	2 7 9.602	45.315	−0.059
	ξ² Ceti	E.	7	1 52 32.511	+0.313	−0.310	+0.015	+0.290	0.000	32.819	2 22 18.132	+0 29 45.313	−0.057
	36 H. Cassiop.	W.	7	1 57 51.350	−0.613	−0.074	+0.402	−1.078	+0.006	49.993	2 27 35.208	+0 29[45.215]	. . .
	ν Arietis		7	2 2 49.226	−0.338	−0.029	+0.009	−0.352	+0.011	48.527	2 32 33.722	45.195	+0.061
	δ Ceti		7	2 4 5.616	−0.299	−0.023	−0.048	−0.327	+0.013	4.932	2 33 50.261	45.329	−0.073
	γ Ceti		7	2 7 51.021	−0.304	−0.014	−0.041	−0.327	+0.017	50.352	2 37 35.620	45.268	−0.012
	μ Ceti		7	2 9 14.737	−0.316	−0.011	−0.023	−0.332	+0.018	14.073	2 38 59.257	45.184	+0.072
	σ Arietis		7	2 15 40.159	−0.325	+0.004	−0.010	−0.338	+0.025	39.515	2 45 24.770	45.255	+0.001
	47 Cephei, H.		7	2 21 46.714	−0.811	+0.049	+0.688	−1.712	+0.032	44.960	2 51 30.337	[45.377]	. .
	α Ceti	W.	7	2 26 46.776	−0.305	+0.029	−0.039	−0.328	+0.037	46.170	2 56 31.428	+0 29 45.258	−0.002

NORMAL EQUATIONS.

Assuming
$a' = +0^s.127 + da'$ circle E.
$a'' = -0.179 + da''$ " W.
$c = +0.308 + dc$ " E.
$\triangle T = +0^h 29^m 45^s.254 + dt.$

$$\left\{\begin{array}{l} 0 = +0.106 + 2.503\,da' \qquad\qquad\qquad - 1.445\,dc + 0.072\,dt \\ \quad -0.080 \qquad\qquad + 2.944\,da'' + 2.162\,dc + 0.239\,dt \\ \quad -0.106 - 1.445\,da' + 2.162\,da'' + 18.929\,dc - 0.484\,dt \\ \quad -0.002 + 0.072\,da' + 0.239\,da'' - 0.484\,dc + 11.779\,dt \end{array}\right\}$$

whence
$da' = -0^s.043$
$da'' = +0.028$
$dc = -0.001$
$dt = 0.000$

$a' = +0^s.084$ (circle east); $a'' = -0^s.151$ (circle west); $c = 0^s.307$ (+ with circle east).

Chronometer No. 1295, at $1^h 52^m.2$ chron. time, $0^h 29^m 45^s.256 \pm 0^s.013$ slow, losing $0^s.064$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 6	α Tauri	W.	7	3 59 50.503	−0.328	−0.119	+0.011	−0.356	−0.041	49.670	4 29 36.562	+0 29 46.892	−0.047
	Gr. 848		7	4 4 20.779	−0.692	−0.213	−0.908	−1.389	−0.036	17.541	4 34 4.399	[46.858]	. . .
	μ Eridani		7	4 10 14.077	−0.293	−0.073	+0.099	−0.343	−0.030	13.437	4 40 0.267	46.830	+0.015
	i Tauri		7	4 15 10.351	−0.332	−0.065	−0.001	−0.361	−0.024	9.568	4 44 56.437	46.869	−0.024
	π⁵ Orionis		7	4 18 45.223	−0.303	−0.048	+0.074	−0.342	−0.021	44.583	4 48 31.460	46.877	−0.032
	10 Camelop.		7	4 23 53.500	−0.473	−0.050	−0.358	−0.690	−0.015	51.914	4 53 38.774	[46.860]	. . .
	ι Tauri		7	4 26 45.363	−0.338	−0.025	−0.015	−0.367	−0.012	44.606	4 56 31.358	46.752	+0.093
	11 Orionis	W.	7	4 28 30.979	−0.326	−0.020	+0.015	−0.354	−0.010	30.284	4 58 17.124	+0 29 46.840	+0.005
	19 H. Camelop.	E.	7	4 34 42.307	+0.816	−0.542	−1.629	+1.598	−0.003	42.547	5 4 29.376	+0 29[46.829]	. .
	τ Orionis		7	4 42 28.779	+0.286	−0.199	+0.152	+0.304	+0.005	29.327	5 12 16.214	46.887	−0.042
	17 Camelop.		7	4 50 0.729	+0.494	−0.356	−0.545	+0.665	+0.013	1.000	5 19 47.829	[46.829]	. . .
	δ Orionis		7	4 56 36.106	+0.298	−0.222	+0.114	+0.302	+0.020	36.618	5 26 23.490	46.872	−0.027
	φ¹ Orionis		7	4 58 59.790	+0.316	−0.239	+0.056	+0.306	+0.023	60.252	5 28 47.109	46.857	−0.012
	ζ Tauri		7	5 1 17.199	+0.337	−0.258	−0.017	+0.324	+0.025	17.610	5 31 4.454	46.844	+0.001
	σ Orionis		7	5 3 26.454	+0.294	−0.228	+0.127	+0.302	+0.028	26.977	5 33 13.709	46.732	+0.113
	130 Tauri	E.	7	5 11 14.266	+0.331	−0.268	+0.005	+0.317	+0.036	14.687	5 41 1.576	+0 29 46.889	−0.044

NORMAL EQUATIONS.

Assuming
$a' = +0^s.249 + da'$ circle W.
$a'' = +0.368 + da''$ " E.
$c = +0.336 + dc$ " E.
$\triangle T = +0^h 29^m 46^s.845 + dt.$

$$\left\{\begin{array}{l} 0 = -0.010 + 2.291\,da' \qquad\qquad\qquad + 1.984\,dc - 0.234\,dt \\ \quad +0.019 \qquad\qquad + 2.750\,da'' - 1.623\,dc + 0.392\,dt \\ \quad +0.227 + 1.984\,da' - 1.623\,da'' + 19.853\,dc - 0.211\,dt \\ \quad +0.005 - 0.234\,da' + 0.392\,da'' - 0.211\,dc + 12.921\,dt \end{array}\right\}$$

whence
$da' = +0^s.017$
$da'' = -0.015$
$dc = -0.014$
$dt = 0.000$

$a' = +0^s.266$ (circle west); $a'' = +0^s.353$ (circle east); $c = 0^s.322$ (+ with circle east).

Chronometer No. 1295, at $4^h 37^m.8$ chron. time, $0^h 29^m 46^s.845 \pm 0^s.010$ slow, losing $0^s.065$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 7	47 Cephei, H . . .	E.	6	2 21 41.321	+0.811	−0.332	−2.013	+2.057	−0.061	41.783	2 51 30.171	+0 29[48.388]	. . .
	α Ceti		7	2 26 42.241	+0.305	−0.135	+0.113	+0.394	−0.053	42.865	2 56 31.410	48.545	+0.056
	δ Arietis		7	2 35 30.871	+0.334	−0.165	−0.007	+0.417	−0.040	31.410	3 5 19.987	48.577	+0.024
	ζ Arietis	.	7	2 38 45.280	+0.336	−0.174	−0.018	+0.420	−0.035	45.809	3 8 34.409	48.600	+0.001
	ο Tauri		7	2 49 4.164	+0.314	−0.184	+0.076	+0.397	−0.020	4.747	3 18 53.374	48.627	−0.026
	2 H. Camelop. . .		7	2 50 20.793	+0.469	−0.278	−0.573	+0.776	−0.018	21.169	3 20 9.885	[48.716]	. . .
	ξ Tauri	E.	7	2 51 23.013	+0.315	−0.190	+0.071	+0.398	−0.017	23.590	3 21 12.237	+0 29 48.647	−0.046
	Gr. 716 . . .	W.	7	3 2 50.564	−0.502	+0.097	−0.715	−0.949	0.000	48.495	3 32 37.029	+0 29[48.534]	. . .
	γ Camelop. H. . .	.	7	3 9 0.043	−0.588	+0.172	−1.158	−1.329	+0.009	57.149	3 38 45.844	[48.695]	. . .
	η Tauri	.	7	3 11 8.651	−0.343	+0.109	−0.048	−0.473	+0.012	7.908	3 40 56.556	48.648	−0.047
	27 Tauri	.	7	3 12 49.216	−0.343	+0.119	−0.048	−0.473	+0.015	48.486	3 42 37.129	48.643	−0.042
	γ Eridani		7	3 23 5.581	−0.274	+0.136	+0.261	−0.446	+0.030	5.288	3 52 53.936	48.648	−0.047
	λ Tauri		7	3 24 47.016	−0.320	+0.167	+0.053	−0.443	+0.033	46.506	3 54 35.058	48.552	+0.049
	ν Tauri		7	3 27 30.101	−0.309	+0.175	+0.104	−0.435	+0.037	29.673	3 57 18.238	48.565	+0.036
	A¹ Tauri	W.	7	3 28 23.503	−0.339	+0.196	−0.029	−0.466	+0.038	22.903	3 58 11.463	−0 29 48.560	+0.041

NORMAL EQUATIONS.

Assuming
$a' = +0^s.425 + da'$ circle E.
$a'' = +0.457 + da''$ " W.
$c = +0.431 + dc$ " E.
$\triangle T = +0^h 29^m 48^s.605 + dt.$

$$\left\{\begin{array}{l} 0 = -0.077 + 2.220\,da' \qquad - 2.131\,dc - 0.306\,dt \\ \quad -0.006 \qquad + 2.302\,da'' + 1.951\,dc - 0.366\,dt \\ \quad +0.347 - 2.131\,da' + 1.951\,da'' + 18.890\,dc - 1.344\,dt \\ \quad +0.008 - 0.306\,da' - 0.366\,da'' - 1.344\,dc + 12.011\,dt \end{array}\right\}$$

whence
$da' = +0^s.017$
$da'' = +0.018$
$dc = -0.018$
$dt = -0.002$

$a' = +0^s.442$ (circle east); $a'' = +0^s.475$ (circle west); $c = 0^s.413$ (+ with circle east).

Chronometer No. 1295, at $3^h\,2^m.7$ chron. time, $0^h\,29^m\,48^s.601 \pm 0^s.009$ slow, losing $0^s.089$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 18	δ Tauri	E.	7	3 46 30.384	+0.330	−0.051	+0.014	+0.381	−0.033	31.025	4 16 35.367	+0 30 4.342	−0.009
	ε Tauri		7	3 52 6.554	+0.333	−0.066	−0.005	+0.385	−0.027	7.272	4 22 11.529	4.355	−0.022
	α Tauri		7	3 59 31.429	+0.328	−0.083	+0.025	+0.379	−0.020	32.058	4 29 36.498	4.440	−0.107
	ν Eridani	.	7	4 0 44.293	+0.293	−0.077	+0.233	+0.365	−0.018	45.089	4 30 49.366	4.277	+0.056
	Gr. 848 . . .	.	7	4 3 59.579	+0.692	−0.200	−2.117	+1.478	−0.015	59.417	4 34 3.911	[4.494]	. .
	μ Eridani		7	4 9 55.117	+0.293	−0.099	+0.232	+0.365	−0.009	55.899	4 40 0.198	4.299	+0.034
	α Camelop. . . .	E.	7	4 13 3.286	+0.524	−0.190	−1.133	+0.901	−0.006	3.382	4 43 7.536	+0 30 [4.154]	. . .
	10 Camelop. . . .	W.	7	4 23 36.371	−0.473	−0.401	−0.502	−0.815	+0.005	34.185	4 53 38.622	+0 30 [4.457]	. . .
	ι Tauri		7	4 26 28.146	−0.338	−0.286	−0.021	−0.434	+0.008	27.075	4 56 31.312	4.237	+0.096
	11 Orionis		7	4 28 13.744	−0.326	−0.276	+0.022	−0.419	+0.010	12.755	4 58 17.086	4.331	+0.002
	β Eridani		7	4 32 23.146	−0.290	−0.247	+0.151	−0.406	+0.013	22.367	5 2 26.727	4.360	−0.027
	19 H. Camelop. .		6	4 34 29.948	−0.816	−0.697	−1.721	−2.138	+0.016	24.592	5 4 28.862	[4.270]	. . .
	β Orionis		7	4 39 11.744	−0.284	−0.244	+0.170	−0.408	+0.021	10.999	5 9 15.336	4.337	−0.004
	τ Orionis . . .	.	7	4 42 12.433	−0.286	−0.246	+0.161	−0.407	+0.024	11.679	5 12 16.176	4.497	−0.164
	η Orionis	W.	7	4 48 53.436	−0.295	−0.256	+0.134	−0.404	+0.031	52.646	5 18 56.836	+0 30 4.190	+0.143

NORMAL EQUATIONS.

Assuming
$a' = +0^s.711 + da'$ circle E.
$a'' = +0.274 + da''$ " W.
$c = +0.368 + dc$ " E.
$\triangle T = +0^h 30^m 4^s.340 + dt.$

$$\left\{\begin{array}{l} +0.266 + 2.571\,da' \qquad - 2.065\,dc - 0.104\,dt \\ -0.289 \qquad + 2.810\,da'' + 1.020\,dc + 0.817\,dt \\ -0.591 - 2.065\,da' + 1.020\,da'' + 18.656\,dc - 0.963\,dt \\ -0.001 - 0.104\,da' + 0.817\,da'' - 0.963\,dc + 11.856\,dt \end{array}\right\}$$

whence
$da' = -0^s.091$
$da'' = +0.099$
$dc = +0.016$
$dt = -0.006$

$a' = +0^s.620$ (circle east); $a'' = +0^s.373$ (circle west); $c = 0^s.384$ (+ with circle east).

Chronometer No. 1295, at $4^h\,18^m.7$ chron. time, $0^h\,30^m\,4^s.333 \pm 0^s.017$ slow, losing $0^s.061$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 20	Gr. 848	.	7	4 3 57.000	+0.692	−0.116	− 2.827	+1.405	−0.106	56.048	4 34 3.810	+0 30 [7.762]	. . .
	μ Eridani	.	7	4 9 51.926	+0.293	−0.007	+ 0.310	+0.347	−0.100	52.769	4 40 0.186	7.417	+0.001
	i Tauri	.	7	4 14 48.290	+0.032	+0.032	− 0.002	+0.365	−0.095	48.922	4 44 56.373	7.451	−0.033
	66 Orionis	.	7	5 29 1.727	+0.306	+0.055	+ 0.205	+0.347	−0.015	2.625	5 59 10.016	7.391	+0.027
	ν Orionis . . .		7	5 31 9.593	+0.325	+0.057	+ 0.055	+0.358	−0.013	10.375	6 1 17.849	7.474	−0.056
	22 Camelop. . . .		7	5 36 37.021	+0.564	+0.086	− 1.823	+0.982	−0.007	37.723	6 6 44.826	[7.103]	. . .
	5 Monocerotis . .		7	5 39 21.459	+0.288	+0.041	+ 0.348	+0.348	−0.004	22.480	6 9 29.867	7.387	+0.031
	8 Monocerotis . .	E.	7	5 47 48.461	+0.307	+0.033	+ 0.199	+0.347	+0.005	49.352	6 17 56.760	+0 30 7.408	+0.010
	23 H. Camelop. . .	W.	7	5 57 29.993	−0.848	−0.051	− 3.420	−2.155	+0.015	23.534	6 27 31.196	+0 30 [7.662]	. . .
	γ Geminorum .		7	6 1 15.114	−0.328	−0.015	+ 0.024	−0.403	+0.019	14.411	6 31 21.821	7.410	+0.008
	S Monocerotis .		6	6 4 48.788	−0.316	−0.010	+ 0.104	−0.392	+0.023	48.197	6 34 55.620	7.423	−0.005
	18 Monocerotis .		7	6 12 1.066	−0.303	−0.002	+ 0.192	−0.386	+0.031	0.598	6 42 7.960	7.362	+0.056
	51 Cephei, H .		7	6 19 20.714	−2.351	+0.045	−13.431	−7.958	+0.038	57.057	6 49 3.730	[6.673]	. . .
	19 Monocerotis .		7	6 27 20.539	−0.292	+0.014	+ 0.268	−0.387	+0.047	20.189	6 57 27.639	7.450	−0.032
	γ Canis Majoris .		7	6 28 40.274	−0.272	+0.015	+ 0.405	−0.401	+0.048	40.069	6 58 47.500	7.431	−0.013
	20 Monocerotis .	W.	7	6 34 39.327	−0.292	+0.021	+ 0.268	−0.387	+0.055	38.992	7 4 46.407	+0 30 7.415	+0.003

NORMAL EQUATIONS.

Assuming
$a' = +0^s.845 + da'$ circle E.
$a'' = +0.692 + da''$ " W.
$c = +0.372 + dc$ " E.
$\triangle T = +0^h 30^m 7^s.417 + dt.$

$$\left.\begin{array}{l} 0 = +0.040 + 2.864\,da' \qquad\qquad\qquad - 1.636\,dc + 0.462\,dt \\ \quad -0.021 \qquad\qquad + 4.102\,da'' + 1.220\,dc + 1.419\,dt \\ \quad +0.076 - 1.636\,da' + 1.220\,da'' + 20.199\,dc + 0.643\,dt \\ \quad +0.006 + 0.462\,da' + 1.419\,da'' + 0.643\,dc + 12.405\,dt \end{array}\right\} \text{whence } \begin{array}{l} da' = -0^s.017 \\ da'' = +0.007 \\ dc = -0.006 \\ dt = 0.000 \end{array}$$

$a' = +0^s.828$ (circle east); $a'' = +0^s.699$ (circle west); $c = 0^s.366$ (+ with circle east).

Chronometer No. 1295, at $5^h 43^m.4$ chron. time, $0^h 30^m 7^s.418 \pm 0^s.006$ slow, losing $0^s.064$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	
Jan. 21	γ Tauri	E.	7	3 43 22.231	+0.326	+0.079	+ 0.031	+0.415	−0.056	23.026	4 13 31.890	+0 30 8.864	+0.020
	δ Tauri	.	7	3 46 25.693	+0.330	+0.063	+ 0.012	+0.419	−0.053	26.464	4 16 35.338	8.874	+0.010
	ε Tauri . . .	.	7	3 52 1.856	+0.333	+0.030	− 0.004	+0.423	−0.047	2.591	4 22 11.503	8.912	−0.028
	α Tauri	.	7	3 59 26.791	+0.328	−0.017	+ 0.022	+0.417	−0.039	27.502	4 29 36.473	8.971	−0.087
	ν Eridani . .	.	7	4 0 39.691	+0.293	−0.028	+ 0.210	+0.401	−0.037	40.530	4 30 49.340	8.811	+0.073
	Gr. 848 . .		7	4 3 54.436	+0.692	−0.092	− 1.905	+1.624	−0.034	54.721	4 34 3.756	[9.035]	. . .
	μ Eridani . . .		7	4 9 50.487	+0.293	−0.070	+ 0.209	+0.401	−0.028	51.292	4 40 0.179	8.887	−0.003
	α Camelop. . . .	E.	7	4 12 58.414	+0.524	−0.152	− 1.020	+0.990	−0.025	58.731	4 43 7.456	+0 30 [8.725]	. . .
	ο Orionis	W.	7	5 3 5.277	−0.294	−0.035	+ 0.257	−0.440	+0.029	4.794	5 33 13.681	+0 30 8.887	−0.003
	130 Tauri		7	5 10 53.440	−0.331	−0.004	+ 0.011	−0.462	+0.037	52.691	5 41 1.575	8.884	0.000
	κ Orionis . . .		7	5 12 24.206	−0.282	+0.003	+ 0.342	−0.447	+0.039	23.861	5 42 32.712	8.851	+0.033
	α Orionis . . .	.	7	5 19 4.914	−0.312	+0.032	+ 0.139	−0.444	+0.046	4.375	5 49 13.273	8.898	−0.014
	Lal. 11382 . . .		7	5 24 25.006	−0.293	+0.051	+ 0.262	−0.440	+0.052	24.638	5 54 33.522	8.884	0.000
	66 Orionis . .		7	5 29 1.569	−0.306	+0.071	+ 0.177	−0.441	+0.057	1.127	5 59 10.011	8.884	0.000
	36 Camelop. . . .		7	5 31 41.843	−0.520	+0.140	− 1.275	−1.071	+0.059	39.176	6 1 48.158	[8.982]	. . .
	22 Camelop. . . .	W.	7	5 36 39.186	−0.564	+0.190	− 1.572	−1.238	+0.065	36.057	6 6 44.812	+0 30 [8.755]	. . .

NORMAL EQUATIONS.

Assuming
$a' = +0^s.571 + da'$ circle E.
$a'' = +0.705 + da''$ " W.
$c = +0.427 + dc$ " E.
$\triangle T = +0^h 30^m 8^s.884 + dt$

$$\left.\begin{array}{l} 0 = +0.020 + 2.574\,da' \qquad\qquad\qquad - 2.007\,dc - 0.048\,dt \\ \quad -0.016 \qquad\qquad + 2.591\,da'' + 0.968\,dc + 0.658\,dt \\ \quad +0.096 - 2.007\,da' + 0.968\,da'' + 19.663\,dc - 0.060\,dt \\ \quad +0.024 - 0.048\,da' + 0.658\,da'' - 0.060\,dc + 12.907\,dt \end{array}\right\} \text{whence } \begin{array}{l} da' = -0^s.013 \\ da'' = +0.009 \\ dc = -0.007 \\ dt = -0.002 \end{array}$$

$a' = +0^s.558$ (circle east); $a'' = +0^s.714$ (circle west); $c = 0^s.420$ (+ with circle east).

Chronometer No. 1295, at $4^h 36^m.0$ chron. time, $0^h 30^m 8^s.884 \pm 0^s.007$ slow, losing $0^s.064$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 22	α Tauri	E.	7	3 59 25.331	+0.328	+0.024	+0.053	+0.358	−0.035	26.059	4 29 36.464	+0 30 10.405	−0.007
	ν Eridani		7	4 0 37.931	+0.293	+0.018	+0.500	+0.345	−0.034	39.053	4 30 49.331	10.278	+0.120
	Gr. 848		7	4 3 55.643	+0.692	+0.020	−4.537	+1.397	−0.031	53.184	4 34 3.702	[10.518]	. . .
	τ Tauri		7	4 5 27.486	+0.341	+0.003	−0.108	+0.373	−0.029	28.066	4 35 38.530	10.464	−0.066
	μ Eridani	.	7	4 9 48.691	+0.293	−0.009	+0.497	+0.345	−0.025	49.792	4 40 0.171	10.379	+0.019
	α Camelop.	.	7	4 12 58.321	+0.524	−0.035	−2.429	+0.851	−0.022	57.210	4 43 7.428	[10.218]	. . .
	i Tauri	.	7	4 14 45.289	+0.332	−0.028	−0.004	+0.363	−0.020	45.932	4 44 56.357	10.425	−0.027
	π⁵ Orionis	E.	7	4 18 19.966	+0.303	−0.037	+0.371	+0.344	−0.016	20.931	4 48 31.370	+0 30 10.439	−0.041
	ι Tauri	W.	7	4 26 21.454	−0.338	+0.204	−0.075	−0.412	−0.008	20.825	4 56 31.284	+0 30 10.459	−0.061
	11 Orionis	.	7	4 28 7.136	−0.326	+0.192	+0.077	−0.398	−0.006	6.675	4 58 17.056	10.381	+0.017
	β Eridani	.	7	4 32 16.211	−0.290	+0.164	+0.538	−0.386	−0.002	16.235	5 2 26.696	10.461	−0.063
	19 H. Camelop.		7	4 34 26.536	−0.816	+0.454	−6.141	−2.032	0.000	8.001	5 4 28.627	[10.626]	. . .
	66 Orionis		7	5 28 59.714	−0.306	+0.222	+0.330	−0.385	+0.054	59.629	5 59 10.006	10.377	+0.021
	ν Orionis	.	7	5 31 7.729	−0.325	+0.241	+0.088	−0.397	+0.057	7.393	6 1 17.846	10.453	−0.055
	22 Camelop.		7	5 36 38.700	−0.564	+0.448	−2.931	−1.089	+0.062	34.626	6 6 44.796	[10.170]	. . .
	5 Monocerotis	W.	7	5 39 19.421	−0.288	+0.236	+0.559	−0.386	+0.065	19.607	6 9 29.862	+0 30 10.255	+0.143

NORMAL EQUATIONS.

Assuming
$a' = +1^s.360 + da'$ circle E.
$a'' = +1.303 + da''$ " W.
$c = +0.351 + dc$ " E.
$\triangle T = -0^h\ 30^m\ 10^s.398 + dt.$

$$\left\{\begin{aligned} 0 &= +0.107 + 2.656\,da' - 1.892\,dc + 0.077\,dt \\ & -0.106 + 2.973\,da'' + 1.943\,dc + 0.330\,dt \\ & -0.372 - 1.892\,da' + 1.943\,da'' + 20.070\,dc + 0.196\,dt \\ & +0.062 + 0.077\,da' + 0.330\,da'' + 0.196\,dc + 12.687\,dt \end{aligned}\right\}$$

whence $da' = -0^s.031$, $da'' = +0.028$, $dc = +0.013$, $dt = -0.006$

$a' = +1^s.329$ (circle east); $a'' = +1^s.331$ (circle west); $c = 0^s.364$ (+ with circle east).

Chronometer No. 1295, at $4^h\ 34^m.6$ chron. time, $0^h\ 30^m\ 10^s.398 \pm 0^s.014$ slow, losing $0^s.060$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 23	α Tauri	E.	7	3 59 23.883	+0.328	−0.011	+0.039	+0.358	−0.046	24.551	4 29 36.455	+0 30 11.904	−0.106
	ν Eridani		7	4 0 36.679	+0.293	−0.010	+0.362	+0.345	−0.045	37.624	4 30 49.322	11.698	+0.100
	Gr. 848		7	4 3 52.893	+0.692	−0.024	−3.291	+1.397	−0.041	51.626	4 34 3.646	[12.020]	. . .
	τ Tauri		7	4 5 26.104	+0.341	−0.012	−0.078	+0.373	−0.040	26.688	4 35 38.520	11.832	−0.034
	μ Eridani		7	4 9 47.454	+0.293	−0.010	+0.361	+0.345	−0.036	48.407	4 40 0.163	11.756	+0.042
	α Camelop.	.	7	4 12 56.414	+0.524	−0.018	−1.762	+0.851	−0.033	55.976	4 43 7.400	[11.424]	. . .
	i Tauri		7	4 14 43.844	+0.332	−0.012	−0.003	+0.363	−0.031	44.493	4 44 56.349	11.856	−0.058
	π⁵ Orionis	E.	7	4 18 18.674	+0.303	−0.011	+0.269	+0.344	−0.028	19.551	4 48 31.360	+0 30 11.809	−0.011
	11 Orionis	W.	7	4 28 5.794	−0.326	+0.202	+0.054	−0.398	−0.018	5.308	4 58 17.048	+0 30 11.740	+0.058
	β Eridani		7	4 32 14.996	−0.290	+0.223	+0.373	−0.386	−0.014	14.902	5 2 26.688	11.786	+0.012
	19 H. Camelop.		7	4 34 22.557	−0.816	+0.689	−4.263	−2.032	−0.012	16.123	5 4 28.564	[12.441]	. .
	22 Camelop.		7	5 36 37.300	−0.564	−0.272	−2.035	−1.089	+0.048	33.388	6 6 44.780	[11.392]	.
	5 Monocerotis	.	7	5 39 18.404	−0.288	−0.139	+0.388	−0.386	+0.051	18.030	6 9 29.856	11.826	−0.028
	8 Monocerotis		7	5 47 45.486	−0.307	−0.148	+0.222	−0.385	+0.058	44.926	6 17 56.755	11.829	−0.031
	γ Geminorum		7	6 1 10.851	−0.328	−0.158	+0.032	−0.401	+0.072	10.068	6 31 21.821	11.753	+0.045
	S Monocerotis	W.	7	6 4 44.474	−0.316	−0.153	+0.138	−0.390	+0.075	43.828	6 34 55.618	+0 30 11.790	+0.008

NORMAL EQUATIONS.

Assuming
$a' = +0^s.983 + da'$ circle E.
$a'' = +0.956 + da''$ " W.
$c = +0.377 + dc$ " E.
$\triangle T = +0^h\ 30^m\ 11^s.793 + dt.$

$$\left\{\begin{aligned} 0 &= +0.026 + 2.656\,da' - 1.892\,dc + 0.077\,dt \\ & +0.120 + 2.985\,da'' + 1.772\,dc + 0.496\,dt \\ & +0.272 - 1.892\,da' + 1.772\,da'' + 19.966\,dc + 0.246\,dt \\ & +0.076 + 0.077\,da' + 0.496\,da'' + 0.246\,dc + 12.687\,dt \end{aligned}\right\}$$

whence $da' = -0^s.019$, $da'' = -0.032$, $dc = -0.013$, $dt = -0.004$

$a' = +0^s.964$ (circle east); $a'' = +0^s.924$ (circle west); $c = 0^s.364$ (+ with circle east).

Chronometer No. 1295, at $4^h\ 46^m.8$ chron. time, $0^h\ 30^m\ 11^s.798 \pm 0^s.011$ slow, losing $0^s.058$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v.*
1890.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Jan. 24	α Tauri	E.	7	3 59 22.543	+0.328	0.000	+0.020	+0.332	—0.045	23.178	4 29 36.455	+0 30 13.277	—0.038
	π^5 Orionis . . .	.	7	4 18 17.366	+0.303	—0.017	+0.142	+0.319	—0.026	18.087	4 48 31.350	13.263	—0.024
	10 Camelop. . . .	.	7	4 23 24.914	+0.473	—0.033	—0.686	+0.643	—0.021	25.290	4 53 38.560	[13.270]	. .
	ι Tauri	.	7	4 26 17.471	+0.338	—0.027	—0.029	+0.343	—0.018	18.078	4 56 31.267	13.189	+0.050
	11 Orionis	.	7	4 28 3.141	+0.326	—0.027	+0.030	+0.330	—0.016	3.784	4 58 17.039	13.255	—0.016
	β Eridani . . .		7	4 32 12.680	+0.290	—0.028	+0.206	+0.320	—0.012	13.456	5 2 26.679	13.223	+0.016
	19 H. Camelop. . .	.	7	4 34 15.257	+0.816	—0.083	—2.353	+1.688	—0.010	15.315	5 4 28.499	[13.184]	. . .
	τ Orionis . .	E.	7	4 42 2.123	+0.286	—0.035	+0.220	+0.321	—0.002	2.913	5 12 16.136	+0 30 13.223	+0.016
	17 Camelop. . . .	W.	7	4 49 38.421	—0.494	+0.166	—2.836	—0.790	+0.005	34.472	5 19 47.611	+0 30[13.139]	. . .
	Groom. 966 . . .		7	4 54 57.686	—0.671	+0.283	—5.913	—1.385	+0.011	50.011	5 25 3.393	[13.382]	. . .
	φ^1 Orionis		7	4 58 34.049	—0.316	+0.152	+0.292	—0.364	+0.014	33.827	5 28 47.075	13.248	—0.009
	θ^1 Orionis . .	.	7	4 59 39.016	—0.289	+0.143	+0.750	—0.361	+0.015	39.274	5 29 52.488	13.214	+0.025
	ζ Tauri	.	7	5 0 51.754	—0.337	+0.175	—0.088	—0.385	+0.017	51.136	5 31 4.421	13.285	—0.046
	σ Orionis . . .	.	7	5 3 0.203	—0.294	+0.162	+0.662	—0.359	+0.019	0.393	5 33 13.668	13.275	—0.036
	130 Tauri		7	5 10 48.831	—0.331	+0.224	+0.028	—0.377	+0.027	48.402	5 41 1.566	13.164	+0.075
	κ Orionis . .	W.	7	5 12 18.987	—0.282	+0.198	+0.880	—0.364	+0.028	19.447	5 42 32.696	+0 30 13.249	—0.010

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming } a' = +\overset{s.}{0.534} + da' \text{ circle E.} & \left\{\begin{array}{l} 0 = +0.074 + 2.639\,da' \qquad\qquad\qquad - 1.616\,dc + 0.304\,dt \\ \quad\; -0.092 \qquad\qquad + 2.668\,da'' + 1.339\,dc + 0.442\,dt \\ \quad\; -0.218 - 1.616\,da' + 1.339\,da'' + 19.746\,dc - 0.065\,dt \\ \quad\; +0.019 + 0.304\,da' + 0.442\,da'' - 0.065\,dc + 12.931\,dt \end{array}\right\} & \text{whence } da' = -\overset{s.}{0.024} \\
a'' = +1.807 + da'' \text{ `` W.} & & da'' = +0.031 \\
c = +0.332 + dc \text{ `` E.} & & dc = +0.007 \\
\triangle T = +0^h\,30^m\,13^s.240 + dt. & & dt = -0.002
\end{array}
$$

$a' = +0^s.510$ (circle east); $a'' = +1^s.838$ (circle west); $c = 0^s.339$ (+ with circle east).

Chronometer No. 1295, at $4^h\,44^m.3$ chron. time, $0^h\,30^m\,13^s.239 \pm 0^s.007$ slow, losing $0^s.060$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v.*
Jan. 25	γ Tauri	W.	7	3 43 17.746	—0.326	+0.020	+0.114	—0.345	—0.031	17.178	4 13 31.848	+0 30 14.670	—0.030
	δ Tauri	.	7	3 26 21.251	—0.330	+0.024	+0.045	—0.349	—0.028	20.613	4 16 35.296	14.683	—0.043
	ϵ Tauri . .		7	3 51 57.510	—0.333	+0.037	—0.016	—0.352	—0.023	56.823	4 22 11.465	14.642	—0.002
	α Tauri .		7	3 59 22.394	—0.328	+0.050	+0.082	—0.347	—0.016	21.835	4 29 36.435	14.600	+0.040
	ν Eridani . .	.	7	4 0 34.509	—0.293	+0.046	+0.767	—0.334	—0.014	34.681	4 30 49.303	14.622	+0.018
	Gr. 848 . .	.	7	4 3 57.586	—0.692	+0.123	—6.964	—1.352	—0.011	48.690	4 34 3.532	[14.842]	. . .
	τ Tauri		7	4 5 24.669	—0.341	+0.065	—0.165	—0.361	—0.010	23.857	4 35 38.498	14.641	—0.001
	α Camelop. . .	W.	7	4 12 57.821	—0.524	+0.120	—3.729	—0.824	—0.002	52.862	4 43 7.340	+0 30[14.478]	. . .
	ι Tauri	E.	7	4 26 16.081	+0.338	—0.025	—0.084	+0.315	+0.011	16.636	4 56 31.258	+0 30 14.622	+0.018
	11 Orionis . . .		7	4 28 1.741	+0.326	—0.035	+0.087	+0.304	+0.013	2.436	4 58 17.030	14.594	+0.046
	β Eridani . .		7	4 32 10.894	+0.290	—0.056	+0.608	+0.294	+0.017	12.047	5 2 26.670	14.623	+0.017
	19 H. Camelop. . .	.	7	4 34 18.493	+0.816	—0.192	—6.944	+1.550	+0.019	13.742	5 4 28.433	[14.691]	. . .
	β Orionis		7	4 38 59.419	+0.284	—0.093	+0.686	+0.296	+0.023	60.615	5 9 15.288	14.673	—0.033
	τ Orionis		7	4 42 0.344	+0.286	—0.112	+0.650	+0.295	+0.026	1.489	5 12 16.128	14.639	+0.001
	γ Orionis . . .	E.	7	4 48 58.530	+0.310	—0.164	+0.319	+0.295	+0.033	59.323	5 19 13.992	+0 30 14.669	—0.029

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming } a' = +\overset{s.}{2.042} + da' \text{ circle W.} & \left\{\begin{array}{l} 0 = -0.020 + 2.441\,da' \qquad\qquad\qquad + 2.470\,dc - 0.503\,dt \\ \quad\; -0.013 \qquad\qquad + 2.099\,da'' - 0.194\,dc + 1.183\,dt \\ \quad\; -0.176 + 2.470\,da' - 0.194\,da'' + 18.421\,dc - 0.925\,dt \\ \quad\; +0.031 - 0.503\,da' + 1.183\,da'' - 0.925\,dc + 12.466\,dt \end{array}\right\} & \text{whence } da' = -\overset{s.}{0.002} \\
a'' = +1.496 + da'' \text{ `` E.} & & da'' = +0.009 \\
c = +0.303 + dc \text{ `` E.} & & dc = +0.010 \\
\triangle T = +\ 0^h\,30^m\,14^s.641 + dt. & & dt = -0.003
\end{array}
$$

$a' = +2^s.040$ (circle west); $a'' = +1^s.505$ (circle east); $c = 0^s.313$ (+ with circle east).

Chronometer No. 1295, at $4^h\,15^m.3$ chron. time, $0^h\,30^m\,14^s.640 \pm 0^s.006$ slow, losing $0^s.059$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Feb. 5	τ Orionis	W.	7	4 41 49.664	—0.286	+0.010	+ 0.443	—0.342	—0.023	49.466	5 12 16.001	+0 30 26.535	—0.061
	η Orionis . . .		7	4 38 30.676	—0.295	+0.014	+ 0.367	—0.340	—0.019	30.403	5 18 56.836	26.433	+0.041
	Groom. 966. . .		7	4 54 41.336	—0.671	+0.038	— 3.301	—1.311	—0.014	36.077	5 25 2.818	[26.741]	.
	Groom. 944. .		4	4 56 44.037	—1.474	+0.089	—11.125	—4.016	—0.013	27.498	5 26 53.457	[25.959]	. . .
	ζ Tauri . . .	.	7	5 0 38.657	—0.337	+0.021	— 0.049	—0.364	—0.010	37.918	5 31 4.315	26.397	+0.077
	σ Orionis	.	7	5 2 47.381	—0.294	+0.021	+ 0.369	—0.340	—0.009	47.128	5 33 13.566	26.438	+0.036
	130 Tauri . . .		7	5 10 35.789	—0.331	+0.027	+ 0.015	—0.357	—0.003	35.140	5 41 1.475	26.335	+0.139
	κ Orionis	W.	7	5 12 6.164	—0.282	+0.024	+ 0.491	—0.345	—0.002	6.050	5 42 32.585	+0 30 26.535	—0.061
	α Orionis . . .	E.	7	5 18 45.983	+0.312	—0.173	+ 0.250	+0.302	+0.003	46.677	5 49 13.170	+0 30 26.493	—0.019
	Lal. 11382 . . .		7	5 24 6.130	+0.293	—0.198	+ 0.474	+0.300	+0.006	7.005	5 54 33.411	26.406	+0.068
	66 Orionis . .		7	5 28 42.730	+0.306	—0.219	+ 0.320	+0.301	+0.009	43.447	5 59 9.895	26.448	+0.026
	ν Orionis . .		7	5 30 50.744	+0.325	—0.237	+ 0.085	+0.310	+0.011	51.238	6 1 17.768	26.530	—0.056
	22 Camelop. . . .	.	7	5 36 20.171	+0.564	—0.439	— 2.843	+0.851	+0.015	18.319	6 6 44.476	[26.157]	. . .
	η Geminorum .	.	7	5 37 47.684	+0.340	—0.269	— 0.099	+0.325	+0.016	47.997	6 8 14.547	26.550	—0.076
	μ Geminorum . .	.	7	5 45 51.771	+0.340	—0.291	— 0.101	+0.325	+0.022	52.066	6 16 18.657	26.591	—0.117
	α Argus	E.	7	5 51 3.179	+0.168	—0.150	+ 2.013	+0.494	+0.023	5.727	6 21 32.051	+0 30[26.324]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +\overset{s.}{1.020} + da' \text{ circle W.} & \left\{\begin{array}{l} 0 = +0.005 + 3.391\,da' \qquad\qquad + 1.496\,dc + 1.061\,dt \\ \quad +0.056 \qquad\qquad + 2.633\,da'' + 0.717\,dc + 1.073\,dt \\ \quad +0.191 + 1.496\,da' + 0.717\,da'' + 19.529\,dc + 0.953\,dt \\ \quad +0.142 + 1.061\,da' + 1.073\,da'' + 0.953\,dc + 12.898\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = +\overset{s.}{0.006} \\ da'' = -0.015 \\ dc = -0.009 \\ dt = -0.010 \end{array} \\
& a'' = +1.306 + da'' \text{ `` E.} & & \\
& c = +0.329 + dc \text{ `` E.} & & \\
& \triangle T = +0^h\,30^m\,26^s.474 + dt. & &
\end{array}
$$

$a' = +1^s.026$ (circle west); $a'' = +1^s.291$ (circle east); $c = 0^s.320$ (+ with circle east).

Chronometer No. 1295, at $5^h\,15^m.2$ chron. time, $0^h\,30^m\,26^s.474 \pm 0^s.015$ slow, losing $0^s.042$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 7	130 Tauri . . .	E.	7	5 10 32.073	+0.331	—0.151	+ 0.021	+0.316	—0.029	32.561	5 41 1.451	+0 30 28.890	—0.032
	κ Orionis	.	7	5 12 2.654	+0.282	—0.135	+ 0.674	+0.306	—0.027	3.754	5 42 32.562	28.808	+0.050
	α Orionis . . .	.	7	5 18 43.573	+0.312	—0.183	+ 0.273	+0.303	—0.021	44.257	5 49 13.150	28.893	—0.035
	Lal. 11382 . . .	.	7	5 24 3.661	+0.293	—0.196	+ 0.517	+0.301	—0.016	4.560	5 54 33.381	28.821	+0.037
	66 Orionis	.	7	5 28 40.276	+0.306	—0.225	+ 0.349	+0.302	—0.012	40.996	5 59 9.876	28.880	—0.022
	36 Camelop. . . .	.	7	5 31 20.643	+0.520	—0.401	— 2.515	+0.733	—0.009	18.971	6 1 47.782	[28.811]	. . .
	22 Camelop. . .	.	7	5 36 17.757	+0.564	—0.480	— 3.102	+0.854	—0.004	15.589	6 6 44.413	[28.824]	. . .
	η Geminorum . .	E.	7	5 37 45.237	+0.340	—0.296	— 0.108	+0.326	—0.003	45.496	6 8 14.529	+0 30 29.033	—0.175
	μ Geminorum . .	W.	7	5 45 50.553	—0.340	0.000	— 0.107	—0.369	+0.005	49.742	6 16 18.639	+0 30 28.897	—0.039
	8 Monocerotis . .		7	5 47 28.113	—0.307	+0.003	+ 0.331	—0.342	+0.006	27.804	6 17 56.675	28.871	—0.013
	α Argus		7	5 51 1.493	—0.168	+0.006	+ 2.148	—0.562	+0.010	2.927	6 21 32.004	[29.077]	. . .
	23 H. Camelop. . .		7	5 57 10.964	—0.848	+0.067	— 6.741	—1.904	+0.016	1.554	6 27 30.426	[28.872]	. . .
	γ Geminorum . .	.	7	6 0 53.510	—0.328	+0.034	+ 0.048	—0.356	+0.019	52.927	6 31 21.767	28.840	+0.018
	S Monocerotis . .	.	7	6 4 27.151	—0.316	+0.042	+ 0.205	—0.346	+0.022	26.758	6 34 55.554	28.796	+0.062
	ξ Geminorum . .	.	7	6 8 38.974	—0.322	+0.052	+ 0.134	—0.350	+0.026	38.514	6 39 7.273	28.759	+0.099
	18 Monocerotis . .	.	7	6 11 39.281	—0.303	+0.056	+ 0.378	—0.341	+0.029	39.100	6 42 7.904	28.804	+0.054
	24 H. Camelop. . .	W.	7	6 13 41.986	—0.735	+0.142	— 5.278	—1.529	+0.031	34.617	6 44 3.837	+0 30[29.220]	. .

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +\overset{s.}{1.420} + da' \text{ circle E.} & \left\{\begin{array}{l} 0 = +0.007 + 2.467\,da' \qquad\qquad - 1.411\,dc + 0.221\,dt \\ \quad -0.210 \qquad\qquad + 4.397\,da'' + 0.636\,dc + 0.881\,dt \\ \quad +0.280 - 1.411\,da' + 0.636\,da'' + 21.537\,dc - 0.349\,dt \\ \quad -0.162 + 0.221\,da' + 0.881\,da'' - 0.349\,dc + 13.209\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = -\overset{s.}{0.012} \\ da'' = +0.048 \\ dc = -0.015 \\ dt = +0.009 \end{array} \\
& a'' = +1.330 + da'' \text{ `` W.} & & \\
& c = +0.336 + dc \text{ `` E.} & & \\
& \triangle T = -0^h\,30^m\,28^s.859 + dt. & &
\end{array}
$$

$a' = +1^s.408$ (circle east); $a'' = +1^s.378$ (circle west); $c = 0^s.321$ (+ with circle east).

Chronometer No. 1295, at $5^h\,40^m.9$ chron. time, $0^h\,30^m\,28^s.858 \pm 0^s.014$ slow, losing $0^s.057$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Feb. 8	17 Camelop. . .	W.	4	4 49 20.108	−0.494	+0.013	−2.123	−0.753	−0.036	16.715	5 19 47.215	+0 30[30.500]	. .
	δ Orionis . . .	.	7	4 55 53.324	−0.298	+0.012	+0.444	−0.342	−0.031	53.109	5 26 23.290	30.181	+0.056
	φ^1 Orionis . . .		7	4 58 17.243	−0.316	+0.014	+0.219	−0.347	−0.029	16.784	5 28 46.935	30.151	+0.086
	ζ Tauri . .	.	7	5 0 34.847	−0.337	+0.016	−0.066	−0.367	−0.027	34.066	5 31 4.280	30.214	+0.023
	δ Doradus . . .		6	5 14 3.792	−0.077	+0.005	+3.338	−0.834	−0.016	6.208	5 44 36.700	[30.492]	. . .
	α Orionis		7	5 18 43.287	−0.312	+0.020	+0.267	−0.345	−0.012	42.905	5 49 13.140	30.235	+0.002
	Lal. 11382 . . .		7	5 24 3.261	−0.293	+0.017	+0.505	−0.342	−0.007	3.141	5 54 33.364	30.223	+0.014
	ν Orionis . . .	.	6	5 30 48.115	−0.325	+0.015	+0.091	−0.354	−0.002	47.540	6 1 17.740	30.200	+0.037
	22 Camelop. . .	W.	7	5 36 18.657	−0.564	+0.020	−3.030	−0.970	+0.003	14.116	6 6 44.380	+0 30[30.264]	. . .
	5 Monocerotis .	E.	7	5 38 58.450	+0.288	−0.194	+0.580	+0.304	+0.005	59.433	6 9 29.724	+0 30 30.291	−0.054
	μ Geminorum .		7	5 45 47.979	+0.340	−0.239	−0.108	+0.327	+0.011	48.310	6 16 18.630	30.320	−0.083
	8 Monocerotis .		7	5 47 25.647	+0.307	−0.217	+0.332	+0.303	+0.012	26.384	6 17 56.667	30.283	−0.046
	α Argus		7	5 50 59.129	+0.168	−0.122	+2.155	+0.498	+0.015	61.843	6 21 31.980	[30.137]	. . .
	23 H. Camelop. .	.	7	5 57 5.064	+0.848	−0.632	−6.761	+1.686	+0.020	0.225	6 27 30.362	[30.137]	. . .
	γ Geminorum . .	.	7	6 0 51.014	+0.328	−0.250	+0.048	+0.315	+0.023	51.478	6 31 21.760	30.282	−0.045
	S Monocerotis .		7	6 4 24.703	+0.316	−0.244	+0.206	+0.307	+0.026	25.314	6 34 55.546	30.232	+0.005
	ξ Geminorum .		7	6 8 36.494	+0.322	−0.254	+0.134	+0.310	+0.030	37.036	6 39 7.266	30.230	+0.007
	43 Camelop. . .	E.	7	6 11 23.779	+0.558	−0.445	−2.978	+0.843	+0.032	21.789	6 41 52.000	+0 30[30.211]	. . .

NORMAL EQUATIONS.

Assuming
$a' = +\overset{s.}{1.340} + da'$ circle W.
$a'' = +1.440 + da''$ " E.
$c = +0.348 + dc$ " E.
$\triangle T = +0^h\,30^m\,30^s.236 + dt.$

$$\left\{\begin{array}{l} 0 = -0.146 + 3.656\,da' \qquad\qquad - 0.357\,dc + 0.809\,dt \\ \quad +0.228 \qquad\qquad + 4.144\,da'' - 0.204\,dc + 0.906\,dt \\ \quad +0.595 - 0.357\,da' - 0.204\,da'' + 22.582\,dc + 0.012\,dt \\ \quad -0.067 + 0.809\,da' + 0.906\,da'' + 0.012\,dc + 13.603\,dt \end{array}\right\}$$

whence
$da' = +\overset{s.}{0.036}$
$da'' = -0.058$
$dc = -0.026$
$dt = +0.007$

$a' = +1^s.376$ (circle west); $a'' = +1^s.382$ (circle east); $c = 0^s.322$ (+ with circle east).

Chronometer No. 1295, at $5^h\,32^m.9$ chron. time, $0^h\,30^m\,30^s.327 \pm 0^s.010$ slow, losing $0^s.050$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 9	17 Camelop. . .	E.	7	4 49 17.493	+0.494	−0.370	−2.191	+0.612	−0.024	16.014	5 19 47.184	+0 30[31.170]	. .
	Groom. 966 . .	.	7	4 54 34.586	+0.671	−0.541	−4.568	+1.072	−0.019	31.201	5 25 2.589	[31.388]	.
	φ^1 Orionis		7	4 58 15.069	+0.316	−0.267	+0.226	+0.282	−0.016	15.610	5 28 46.921	31.311	−0.034
	θ^1 Orionis . .		7	4 59 20.126	+0.289	−0.248	+0.579	+0.279	−0.015	21.010	5 29 52.310	31.300	−0.023
	θ^2 Orionis	.	7	4 59 26.619	+0.289	−0.248	+0.579	+0.279	−0.015	27.503	5 29 58.891	31.388	−0.111
	ζ Tauri		7	5 0 32.709	+0.337	−0.292	−0.068	+0.298	−0.014	32.970	5 31 4.268	31.298	−0.021
	σ Orionis . .	.	7	5 2 41.473	+0.294	−0.262	+0.511	+0.278	−0.013	42.281	5 33 13.513	31.232	+0.045
	130 Tauri . . .		7	5 10 29.754	+0.331	−0.323	+0.021	+0.292	−0.006	30.069	5 41 1.423	31.354	−0.077
	δ Doradus	E.	7	5 14 1.314	+0.077	−0.078	+3.445	+0.678	−0.003	5.433	5 44 36.650	+0 30[31.217]	. .
	α Orionis . .	W.	7	5 18 42.291	−0.311	−0.102	+0.308	−0.321	+0.001	41.866	5 49 13.129	+0 30 31.263	+0.014
	Lal. 11382 . .		7	5 24 2.306	−0.293	−0.083	+0.583	−0.318	+0.006	2.201	5 54 33.348	31.147	+0.130
	66 Orionis . . .		7	5 28 38.893	−0.306	−0.074	+0.394	−0.319	+0.009	38.597	5 59 9.856	31.259	+0.018
	36 Camelop. . .		7	5 31 20.521	−0.520	−0.114	−2.838	−0.774	+0.011	16.286	6 1 47.702	[31.416]	. . .
	22 Camelop. . .		7	5 36 17.993	−0.564	−0.098	−3.499	−0.902	+0.015	12.945	6 6 44.344	[31.399]	. . .
	η Geminorum . .		7	5 37 44.021	−0.340	−0.055	−0.122	−0.344	+0.017	43.177	6 8 14.511	31.334	−0.057
	μ Geminorum .		7	5 45 48.237	−0.340	−0.031	−0.124	−0.344	+0.023	47.421	6 16 18.621	31.200	+0.077
	8 Monocerotis . .		7	5 47 25.661	−0.307	−0.024	+0.381	−0.319	+0.025	25.417	6 17 56.658	31.241	+0.036
	α Argus	W.	7	5 50 58.636	−0.168	−0.008	+2.477	−0.524	+0.028	60.441	6 21 31.955	+0 30[31.514]	. .

NORMAL EQUATIONS.

Assuming
$a' = +\overset{s.}{1.440} + da'$ circle E.
$a'' = +1.530 + da''$ " W.
$c = +0.327 + dc$ " E.
$\triangle T = +0^h\,30^m\,31^s.279 + dt$

$$\left\{\begin{array}{l} 0 = +0.084 + 4.300\,da' \qquad\qquad + 0.289\,dc + 1.070\,dt \\ \quad -0.207 \qquad\qquad + 3.612\,da'' + 0.371\,dc + 0.729\,dt \\ \quad +0.656 + 0.289\,da' + 0.371\,da'' + 22.876\,dc - 0.316\,dt \\ \quad -0.161 + 1.070\,da' + 0.729\,da'' - 0.316\,dc + 13.805\,dt \end{array}\right\}$$

whence
$da' = -\overset{s.}{0.020}$
$da'' = +0.059$
$dc = -0.029$
$dt = +0.009$

$a' = +1^s.420$ (circle east); $a'' = +1^s.530$ (circle west); $c = 0^s.298$ (+ with circle east).

Chronometer No. 1295, at $5^h\,17^m.8$ chron. time, $0^h\,30^m\,31^s.277 \pm 0^s.013$ slow, losing $0^s.050$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Feb. 10	17 Camelop.	W.	7	4 49 17. 900	—0. 494	0. 000	—2. 114	—0. 792	—0. 108	14. 392	5 19 47. 152	+0 30[32. 760]	.
	Groom. 966 . .		4	4 54 36. 088	—0. 671	+0. 011	—4. 407	—1. 388	—0. 103	29. 530	5 25 2. 528	[32. 998]	. . .
	σ Orionis	.	7	5 2 41. 081	—0. 294	+0. 012	+0. 493	—0. 360	—0. 096	40. 836	5 33 13. 499	32. 663	+0. 080
	ν Orionis		7	5 30 45. 596	—0. 325	+0. 025	+0. 090	—0. 372	—0. 070	44. 944	6 1 17. 718	32. 774	—0. 031
	η Geminorum . .		5	5 37 42. 755	—0. 340	+0. 024	—0. 105	—0. 390	—0. 064	41. 880	6 8 14. 502	32. 622	+0. 121
	α Argus . . .		7	5 50 57. 657	—0. 168	+0. 005	+2. 136	—0. 593	—0. 052	58. 985	6 21 31. 929	[32. 944]	. . .
	10 Monocerotis .		4	5 51 59. 457	—0. 290	+0. 007	+0. 540	—0. 361	—0. 051	59. 302	6 22 31. 979	32. 677	+0. 066
	α Canis Majoris .		7	6 9 45. 684	—0. 269	—0. 022	+0. 821	—0. 375	—0. 034	45. 805	6 40 18. 658	32. 853	—0. 110
	18 Monocerotis .	W.	7	6 11 35. 433	—0. 303	—0. 029	+0. 375	—0. 360	—0. 033	35. 083	6 42 7. 878	+0 30 32. 795	—0. 052
	26 Monocerotis .	E.	7	7 5 26. 301	+0. 283	—0. 218	+0. 614	+0. 324	+0. 016	27. 320	7 36 0. 040	+0 30 32. 720	+0. 023
	3 Ursæ Majoris, H	.	7	7 31 22. 971	+0. 556	—0. 462	—2. 770	+0. 885	+0. 040	21. 220	8 1 53. 996	[32. 776]	. . .
	ζ¹ Cancri		6	7 35 21. 606	+0. 331	—0. 279	+0. 010	+0. 336	+0. 044	22. 048	8 5 54. 810	32. 762	—0. 019
	β Cancri		7	7 40 0. 230	+0. 316	—0. 270	+0. 206	+0. 324	+0. 048	0. 854	8 10 33. 569	32. 715	+0. 028
	β Volantis . . .		7	7 53 58. 586	+0. 077	—0. 068	+3. 155	+0. 780	+0. 061	62. 591	8 24 35. 428	[32. 837]	. . .
	ι Hydræ		7	8 2 27. 681	+0. 305	—0. 277	+0. 330	+0. 321	+0. 069	28. 429	8 33 1. 224	32. 795	—0. 052
	ζ Hydræ .		7	8 19 1. 916	+0. 310	—0. 294	+0. 275	+0. 322	+0. 084	2. 613	8 49 35. 393	32. 780	—0. 037
	α Cancri		7	8 21 55. 563	+0. 320	—0. 306	+0. 143	+0. 327	+0. 087	56. 134	8 52 28. 894	32. 760	—0. 017
	σ² Ursæ Majoris . .	E.	7	8 30 13. 629	+0. 540	—0. 528	—2. 579	+0. 839	+0. 094	11. 995	9 0 44. 828	+0 30[32. 833]	. . .

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +1^s.230 + da' \text{ circle W.} & \left\{\begin{array}{l} 0 = -0.531 + 3.917\,da' \qquad\qquad\qquad - 0.588\,dc + 1.599\,dt \\ \quad -0.082 \qquad\qquad + 4.109\,da'' + 0.248\,dc + 0.916\,dt \\ \quad -0.221 - 0.588\,da' + 0.248\,da'' + 22.432\,dc - 0.085\,dt \\ \quad -0.151 + 1.599\,da' + 0.916\,da'' - 0.085\,dc + 13.756\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = +0.140 \\ da'' = +0.021 \\ dc = +0.013 \\ dt = -0.007 \end{array} \\
& a'' = +1.280 + da'' \text{ `` E.} & & \\
& c = +0.327 + dc \text{ `` E.} & & \\
& \triangle T = +0^h\,30^m\,32^s.764 + dt. & &
\end{array}
$$

$a' = +1^s.370$ (circle west); $a'' = +1^s.301$ (circle east); $c = 0^s.340$ (+ with circle east).

Chronometer No. 1295, at $6^h\,47^m.4$ chron. time, $0^h\,30^m\,32^s.743 \pm 0^s.013$ slow, losing $0^s.055$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 11	ε Hydræ	E.	7	8 10 22. 989	+0. 311	—0. 090	+0. 179	+0. 361	—0. 067	23. 683	8 40 57. 708	+0 30 34. 025	+0. 008
	ρ Ursæ Majoris		7	8 22 6. 171	+0. 546	—0. 166	—1. 792	+0. 958	—0. 058	5. 659	8 52 39. 573	[33. 914]	. .
	θ Hydræ . . .	.	7	8 38 4. 484	+0. 304	—0. 107	+0. 238	+0. 358	—0. 045	5. 232	9 8 39. 178	33. 946	+0. 087
	α Hydræ . . .	.	7	8 51 36. 696	+0. 284	—0. 116	+0. 398	+0. 362	—0. 035	37. 589	9 22 11. 636	34. 047	—0. 014
	ο Leonis		7	9 4 42. 817	+0. 317	—0. 142	+0. 126	+0. 364	—0. 025	43. 457	9 35 17. 446	33. 989	+0. 044
	ε Leonis		7	9 9 2. 647	+0. 344	—0. 157	—0. 098	+0. 393	—0. 021	3. 108	9 39 37. 170	34. 062	—0. 029
	η Leonis		7	9 30 46. 200	+0. 330	—0. 137	+0. 018	+0. 375	—0. 004	46. 782	10 1 20. 894	34. 112	—0. 079
	α Leonis	.	7	9 31 56. 794	+0. 321	—0. 131	+0. 093	+0. 367	—0. 003	57. 441	10 2 31. 491	34. 050	—0. 017
	32 Ursæ Majoris . .	E.	7	9 39 30. 936	+0. 520	—0. 195	—1. 567	+0. 868	+0. 002	30. 564	10 10 4. 649	+0 30[34. 085]	. . .
	γ¹ Leonis	W.	7	9 43 21. 760	—0. 336	+0. 154	—0. 029	—0. 425	+0. 006	21. 130	10 13 55. 168	+0 30 34. 038	—0. 005
	9 Draconis, H. . .	.	7	9 55 19. 086	—0. 708	+0. 344	—2. 850	—1. 678	+0. 015	14. 209	10 25 48. 516	[34. 307]	. . .
	35 H. Ursæ Majoris	.	7	10 4 43. 100	—0. 568	+0. 288	—1. 790	—1. 145	+0. 022	39. 907	10 35 13. 890	[33. 983]	. . .
	41 Leonis Minoris .		7	10 6 53. 457	—0. 342	+0. 175	—0. 080	—0. 435	+0. 024	52. 799	10 37 26. 767	33. 968	+0. 065
	l Leonis		7	10 12 55. 513	—0. 318	+0. 168	+0. 104	—0. 406	+0. 029	55. 090	10 43 29. 153	34. 063	—0. 030
	α Ursæ Majoris . .		7	10 26 26. 314	—0. 489	+0. 273	—1. 193	—0. 857	+0. 039	24. 087	10 56 57. 973	[33. 886]	.
	χ Leonis	.	7	10 28 47. 469	—0. 313	+0. 177	+0. 146	—0. 402	+0. 041	47. 118	10 59 21. 114	33. 996	+0. 037
	δ Leonis		7	10 37 42. 574	—0. 337	+0. 197	—0. 039	—0. 427	+0. 048	42. 016	11 8 16. 117	34. 101	—0. 068
	σ Leonis	W.	7	10 44 54. 674	—0. 311	+0. 187	+0. 165	—0. 401	+0. 054	54. 368	11 15 28. 400	+0 30 34. 032	+0. 001

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming} & a' = +0^s.844 + da' \text{ circle E.} & \left\{\begin{array}{l} 0 = -0.098 + 2.300\,da' \qquad\qquad\qquad - 1.507\,dc + 0.067\,dt \\ \quad +0.076 \qquad\qquad + 3.337\,da'' + 3.814\,dc - 1.058\,dt \\ \quad +0.230 - 1.507\,da' + 3.814\,da'' + 22.766\,dc + 0.463\,dt \\ \quad +0.055 + 0.067\,da' - 1.058\,da'' + 0.463\,dc + 14.213\,dt \end{array}\right\} & \begin{array}{l} \text{whence } da' = +0^s.036 \\ da'' = -0.019 \\ dc = -0.004 \\ dt = -0.005 \end{array} \\
& a'' = +0.818 + da'' \text{ `` W.} & & \\
& c = +0.382 + dc \text{ `` E.} & & \\
& \triangle T = +0^h\,30^m\,34^s.035 + dt. & &
\end{array}
$$

$a' = +0^s.880$ (circle east); $a'' = +0^s.799$ (circle west); $c = 0^s.378$ (+with circle east).

Chronometer No. 1295, at $9^h\,36^m.3$ chron. time, $0^h\,30^m\,34^s.033 \pm 0^s.009$ slow, losing $0^s.047$ per hour.

Transits of stars observed at Santo Domingo City, by Lieut. J. A. Norris, U. S. Navy, with transit No. 1503, to determine the correction of sidereal chronometer Negus No. 1295.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v.*
				h. m. s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
1889. Feb. 13	η Geminorum . . .	W.	7	5 37 38.566	−0.340	+0.139	−0.079	−0.344	−0.090	37.852	6 8 14.471	+0 30 36.619	−0.102
	α Argus . .		6	5 50 54.343	−0.168	+0.069	+1.598	−0.524	−0.077	55.241	6 21 31.850	[36.609]	.
	β Canis Minoris . .		7	6 50 35.469	−0.314	+0.134	+0.179	−0.321	−0.018	35.129	7 21 11.604	36.475	+0.042
	Piazzi VII, 116 .		7	6 52 5.510	−0.279	+0.119	+0.520	−0.324	−0.017	5.529	7 22 41.950	36.421	+0.096
	24 Lyncis	W.	7	7 3 8.750	−0.464	+0.202	−1.290	−0.617	−0.006	6.575	7 33 43.094	+0 30[36.519]	. . .
	Groom. 1374 . .	E.	7	7 16 28.657	+0.652	−0.157	−2.562	+1.022	+0.007	27.619	7 47 3.811	+0 30[36.192]	. .
	3 Ursæ Majoris, H.		7	7 31 17.793	+0.556	−0.178	−1.795	+0.769	+0.022	17.167	8 1 53.965	[36.798]	. . .
	ζ¹ Cancri . . .	.	7	7 35 17.741	+0.331	−0.114	+0.007	+0.292	+0.026	18.283	8 5 54.806	36.523	−0.006
	20 Navis		7	7 37 39.837	+0.272	−0.096	+0.488	+0.289	+0.028	40.818	8 8 17.319	36.501	+0.016
	β Cancri . .		7	7 39 56.379	+0.316	−0.116	+0.133	+0.282	+0.030	57.024	8 10 33.565	36.541	−0.024
	30 Monocerotis .	E.	7	7 49 33.114	+0.293	−0.124	+0.317	+0.279	+0.040	33.919	8 20 10.461	+0 30 36.542	−0.025

NORMAL EQUATIONS.

$$\begin{array}{llll}
\text{Assuming } a' = +\overset{s.}{0.818} + da' \text{ circle W.} & \left\{\begin{array}{l} 0 = -0.435 + 2.205\,da' \qquad\qquad\qquad - 0.906\,dc + 0.877\,dt \\ \quad +0.173 \qquad\qquad + 2.823\,da'' - 1.755\,dc + 0.210\,dt \\ \quad -0.164 - 0.906\,da' - 1.755\,da'' + 14.049\,dc + 0.479\,dt \\ \quad -0.146 + 0.877\,da' + 0.210\,da'' + 0.479\,dc + 8.301\,dt \end{array}\right\} & \text{whence} & \begin{array}{l} da' = +\overset{s.}{0.207} \\ da'' = -0.049 \\ dc = +0.019 \\ dt = -0.004 \end{array} \\
a'' = +0.892 + da'' \text{ `` E.} & & & \\
c = +0.279 + dc \text{ `` E.} & & & \\
\Delta T = +0^h 30^m 36^s.530 + dt. & & &
\end{array}$$

$a' = +1^s.025$ (circle west); $a'' = +0^s.843$ (circle east); $c = 0^s.298$ (+ with circle east).

Chronometer No. 1295, at $7^h 9^m.0$ chron. time, $0^h 30^m 36^s.517 \pm 0^s.016$ slow, losing $0^s.059$ per hour.

Transits of stars observed at Vera Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v.*
				h. m. s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
1888. Dec. 26	36 H. Cassiop. . .	E.	7	3 40 56.317	+0.559	+0.081	−4.902	+1.819	−0.030	53.844	2 27 30.716	−1 13[23.128]	.
	δ Ceti		7	3 47 9.094	+0.267	+0.046	+0.615	+0.552	−0.026	10.548	2 23 47.326	23.222	+0.048
	γ Ceti	.	7	3 50 54.476	+0.272	+0.053	+0.526	+0.552	−0.021	55.858	2 37 32.676	23.182	+0.088
	41 Arietis		7	3 56 49.498	+0.314	+0.069	−0.275	+0.618	−0.021	50.203	2 43 26.837	23.326	−0.096
	α Ceti	E.	7	4 9 50.540	+0.273	+0.076	+0.498	+0.552	−0.009	51.903	2 56 28.448	−1 13 23.382	−0.112
	δ Arietis	W.	7	4 18 40.357	−0.300	+0.505	+0.003	−0.627	−0.004	39.934	3 5 16.788	−1 13 23.146	+0.124
	ο Tauri . . .		7	4 32 13.531	−0.281	+0.488	+0.284	−0.598	+0.004	13.628	3 18 50.328	23.300	−0.030
	ξ Tauri		7	4 34 32.382	−0.282	+0.492	+0.266	−0.598	+0.009	32.269	3 21 9.134	23.135	+0.135
	Gr. 716 . . .		7	4 45 58.786	−0.449	+0.803	−2.328	−1.297	+0.012	55.528	3 32 32.442	[23.087]	. .
	η Tauri	.	7	4 54 17.013	−0.308	+0.561	−0.132	−0.646	+0.021	16.509	3 40 53.192	23.317	−0.047
	27 Tauri		7	4 55 57.570	−0.308	+0.566	−0.130	−0.647	+0.021	57.072	3 42 33.739	23.333	−0.063
	A¹ Tauri . . .	W.	7	5 11 31.725	−0.304	+0.573	−0.073	−0.637	+0.034	31.318	3 58 8.098	−1 13 23.220	+0.050

NORMAL EQUATIONS.

$$\begin{array}{llll}
\text{Assuming } a' = +\overset{s.}{1.673} + da' \text{ circle E.} & \left\{\begin{array}{l} 0 = -0.284 + 1.457\,da' \qquad\qquad\qquad - 0.982\,dc + 0.289\,dt \\ \quad -0.018 \qquad\qquad + 0.871\,da'' + 1.178\,dc - 0.382\,dt \\ \quad +0.349 - 0.982\,da' + 1.178\,da'' + 14.478\,dc - 2.424\,dt \\ \quad +0.061 + 0.289\,da' - 0.382\,da'' - 2.424\,dc + 10.515\,dt \end{array}\right\} & \text{whence} & \begin{array}{l} da' = +\overset{s.}{0.186} \\ da'' = +0.037 \\ dc = -0.017 \\ dt = -0.013 \end{array} \\
a'' = +1.503 + da'' \text{ `` W.} & & & \\
c = +0.589 + dc \text{ `` E.} & & & \\
\Delta T = -1^h 13^m 23^s.225 + dt. & & &
\end{array}$$

$a' = +1^s.856$ (circle east); $a'' = +1^s.540$ (circle west); $c = 0^s.572$ (+ with circle east).

Chronometer No. 1254, at $4^h 24^m.3$ chron. time, $1^h 13^m 23^s.270 \pm 0^s.019$ fast, losing $0^s.041$ per hour.

Transits of stars observed at Vera Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
1888. Dec. 27	ξ^2 Ceti	E.	7	3 35 36.081	+0.280	+0.054	+0.374	+0.452	—0.047	37.192	2 22 15.125	—1 13 22.067	—0.088
	36 H. Cassiop.		7	3 40 55.714	+0.559	+0.104	—5.008	+1.476	—0.043	52.802	2 27 30.670	[22.132]	. .
	ν Arietis	.	7	3 45 51.963	+0.304	+0.054	—0.081	+0.481	—0.040	52.861	2 32 30.548	22.133	—0.022
	Br. 366		7	3 48 31.531	+0.490	+0.085	—3.671	+1.163	—0.038	39.860	2 35 17.695	[22.165]	. .
	41 Arietis	.	7	3 56 48.224	+0.314	+0.049	—0.281	+0.502	—0.033	48.875	2 43 26.829	22.046	—0.109
	α Ceti		7	4 9 49.370	+0.273	+0.032	+0.509	+0.448	—0.024	50.608	2 56 28.442	22.166	+0.011
	δ Arietis	E.	7	4 18 38.251	+0.300	+0.023	—0.004	+0.475	—0.017	39.028	3 5 16.781	—1 13 22.249	+0.094
	17 Tauri	W.	7	4 51 39.873	—0.308	+0.336	—0.168	—0.433	+0.004	39.203	3 18 17.040	—1 13 22.163	+0.008
	η Tauri		7	4 54 15.956	—0.308	+0.336	—0.168	—0.433	+0.006	15.288	3 40 53.188	22.100	—0.055
	A¹ Tauri		7	5 11 31.067	—0.304	+0.134	—0.094	—0.525	+0.021	30.299	3 58 8.096	22.203	+0.048
	19 Urs. Minoris, S. P.		7	5 27 6.554	+0.110	—0.038	+8.169	+2.039	+0.030	16.864	4 13 54.940	[21.924]	. . .
	η Urs. Minoris, S. P.	.	7	5 33 52.643	+0.106	—0.027	+8.073	+2.018	+0.034	2.880	4 20 40.599	22.254	+0.011
	α Tauri		7	5 42 56.050	—0.294	+0.053	+0.104	—0.508	+0.040	15.300	4 29 33.234	[22.165]	. . .
	τ Tauri	W.	7	5 48 58.274	—0.306	+0.037	—0.131	—0.529	+0.043	57.417	4 35 35.154	—1 13 22.263	+0.108

NORMAL EQUATIONS.

$$
\begin{array}{lll}
\text{Assuming } a' = +1^s.888 + da' \text{ circle E.} & \left\{ \begin{array}{l} 0 = -0.066 + 2.282\,da' \qquad\qquad - 2.615\,dc - 0.777\,dt \\ \quad + 0.236 \qquad\qquad + 3.817\,da'' + 4.043\,dc + 0.691\,dt \\ \quad + 0.470 - 2.615\,da' + 4.043\,da'' + 18.686\,dc + 2.017\,dt \\ \quad + 0.080 - 0.777\,da' + 0.691\,da'' + 2.017\,dc + 10.650\,dt \end{array} \right\} & \begin{array}{l} \text{whence } da' = +0^s.011 \\ da'' = -0.083 \\ dc = -0.014 \\ dt = -0.002 \end{array} \\
a'' = +2.044 + da'' \text{ “ W.} & & \\
c = +0.482 + dc \text{ “ E.} & & \\
\triangle T = -1^h\,13^m\,22^s.133 + dt. & &
\end{array}
$$

$a' = +1^s.899$ (circle east); $a'' = +1^s.196$ (circle west); $c = 0^s.468$ (+ with circle east).

Chronometer No. 1254, at $4^h\,44^m.6$ chron. time, $1^h\,13^m\,22^s.155 \pm 0^s.015$ fast; losing $0^s.047$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 29	β Trianguli	W.	7	3 16 17.256	—0.331	+0.069	—0.277	—0.446	—0.040	16.311	2 2 56.041	—1 13 20.270	—0.009
	4 Urs. Minoris, S. P.		7	3 22 27.877	+0.172	—0.034	+4.172	+1.779	—0.035	33.831	2 9 13.686	[20.145]	.
	θ Arietis		7	3 25 17.643	—0.299	—0.058	—0.002	—0.390	—0.033	16.861	2 11 56.689	20.172	—0.107
	5 Urs. Minoris, S. P.		7	3 40 57.964	+0.111	—0.017	+3.628	+1.541	—0.020	3.207	2 27 42.446	[20.751]	.
	ν Arietis		7	3 45 51.496	—0.304	+0.044	—0.037	—0.395	—0.017	50.787	2 32 30.529	20.258	—0.021
	δ Ceti		7	3 47 7.759	—0.267	+0.037	+0.288	—0.368	—0.016	7.433	2 33 47.302	20.131	—0.148
	35 Arietis		7	3 50 17.197	—0.365	+0.042	—0.136	—0.414	—0.013	16.311	2 36 56.050	20.261	—0.018
	μ Ceti	W.	7	3 52 17.103	—0.283	+0.036	+0.146	—0.373	—0.012	16.617	2 38 56.184	—1 13 20.433	+0.154
	β Urs. Minoris, S. P.	E.	6	4 4 17.022	+0.070	+0.058	+2.748	—1.235	—0.002	18.641	2 50 58.518	—1 13 [20.123]	. .
	δ Arietis	.	7	4 18 36.060	+0.300	+0.240	—0.001	+0.348	+0.009	36.956	3 5 16.767	20.189	—0.090
	o Tauri		7	4 32 9.593	+0.281	+0.228	+0.135	+0.331	+0.019	10.587	3 18 50.310	20.277	—0.002
	ξ Tauri	.	7	4 34 28.454	+0.282	+0.227	+0.127	+0.333	+0.021	29.444	3 21 9.120	20.320	+0.041
	f Tauri		7	4 38 3.986	+0.251	+0.230	+0.087	+0.336	+0.024	4.914	3 24 44.585	20.329	+0.050
	Gr. 716	.	7	4 45 52.170	+0.449	+0.491	—1.106	+0.719	+0.030	52.753	3 32 32.402	[20.351]	. .
	η Tauri		7	4 54 12.636	+0.308	+0.243	—0.063	+0.358	+0.036	13.518	3 40 53.179	20.339	+0.060
	27 Tauri	E.	7	4 45 53.213	+0.308	+0.243	—0.062	+0.358	+0.038	54.098	3 42 33.729	—1 13 20.369	+0.090

NORMAL EQUATIONS.

$$
\begin{array}{lll}
\text{Assuming } a' = +0^s.732 + da' \text{ circle W.} & \left\{ \begin{array}{l} 0 = -0.150 + 1.501\,da' \qquad\qquad + 0.977\,dc + 0.198\,dt \\ \quad - 0.039 \qquad\qquad + 1.171\,da'' - 1.293\,dc - 0.134\,dt \\ \quad + 0.907 + 0.977\,da' - 1.293\,da'' + 16.626\,dc + 0.708\,dt \\ \quad + 0.237 + 0.198\,da' - 0.134\,da'' + 0.708\,dc + 12.411\,dt \end{array} \right\} & \begin{array}{l} \text{whence } da' = +0^s.138 \\ da'' = +0.088 \\ dc = -0.055 \\ dt = -0.017 \end{array} \\
a'' = +0.645 + da'' \text{ “ E.} & & \\
c = +0.403 + dc \text{ “ E.} & & \\
\triangle T = -1^h\,13^m\,20^s.275 + dt. & &
\end{array}
$$

$a' = +0^s.870$ (circle west); $a'' = +0^s.732$ (circle east); $c = 0^s.348$ (+ with circle east).

Chronometer No. 1254, at $4^h\,7^m.4$ chron. time, $1^h\,13^m\,20^s.279 \pm 0^s.017$ fast, losing $0^s.047$ per hour.

Transits of stars observed at Vera Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1888.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 30	ζ Ceti . . .	E.	7	2 59 16.249	+0.249	+0.003	+0.376	+0.520	−0.035	17.362	1 45 58.320	−1 13 19.042	−0.076
	ν Arietis .		7	3 0 44.257	+0.299	+0.003	+0.007	+0.539	−0.033	45.072	1 47 25.835	19.237	+0.119
	β Arietis .	.	7	3 1 48.203	+0.302	+0.002	−0.014	+0.545	−0.032	49.006	1 48 29.990	19.016	−0.102
	50 Cassiop. . . .	.	7	3 7 17.143	+0.552	0.000	−1.888	+1.644	−0.027	17.424	1 53 58.420	[19.004]	.
	α Arietis . .		7	3 14 12.917	+0.307	−0.002	−0.052	+0.555	−0.021	13.704	2 0 54.550	19.154	+0.036
	β Trianguli . . .		7	3 16 14.546	+0.332	−0.004	−0.236	+0.620	−0.019	15.237	2 2 56.030	19.207	+0.099
	θ Arietis . . .	.	7	3 25 14.944	+0.300	−0.004	−0.002	+0.542	−0.011	15.769	2 11 56.685	19.084	−0.034
	ι Cassiop. . .		7	3 33 14.450	+0.486	−0.008	−1.394	+1.302	−0.004	14.832	2 19 55.780	[19.052]	. . .
	ξ² Ceti . .	E.	7	3 35 33.253	+0.280	−0.005	+0.145	+0.516	−0.002	34.187	2 22 15.098	−1 13 19.089	−0.029
	36 H. Cassiop. .	W.	7	3 40 52.221	−0.559	+0.484	−0.762	−1.818	+0.002	49.568	2 27 30.528	−1 13 [19.040]	
	ν Arietis		7	3 45 50.094	−0.304	+0.333	−0.012	−0.592	+0.007	49.526	2 32 30.519	19.007	−0.111
	δ Ceti .		7	3 47 6.569	−0.267	+0.311	+0.096	−0.551	+0.008	6.266	2 33 47.294	18.972	−0.246
	μ Ceti .		7	3 52 15.610	−0.283	+0.354	+0.048	−0.559	+0.012	15.182	2 38 56.175	19.007	−0.111
	41 Arietis .		7	3 56 46.480	−0.314	+0.408	−0.043	−0.617	+0.016	45.930	2 43 26.810	19.120	+0.002
	47 Cephei, H.		7	4 4 47.364	−0.745	+1.007	−1.306	−2.879	+0.023	43.474	2 51 23.982	[19.491]	. . .
	α Ceti .		7	4 9 47.780	−0.273	+0.375	+0.077	−0.551	+0.028	47.436	2 56 28.422	19.014	−0.104
	ρ Persei .		7	4 11 23.671	−0.341	+0.469	−0.121	−0.702	+0.029	23.005	2 58 3.788	19.217	+0.099
	β Persei		7	4 14 16.797	−0.347	+0.485	−0.138	−0.725	+0.032	16.104	3 0 56.805	19.299	+0.181
	δ Arietis	W.	7	4 18 36.463	−0.300	+0.424	0.000	−0.584	+0.036	36.039	3 5 16.759	−1 13 19.280	+0.162

NORMAL EQUATIONS.

$$
\begin{aligned}
\text{Assuming}\quad a' &= +0^s.686 + da' \quad \text{circle E.} & 0 &= -0.090 + 2.491\,da' - 2.183\,dc - 0.638\,dt & \text{whence } da' &= +0^s.053\\
a'' &= +0.419 + da'' \quad \text{" W.} & & +0.127 + 2.263\,da'' + 3.751\,dc - 1.092\,dt & da'' &= -0.131\\
c &= +0.516 + dc \quad \text{" E.} & & +0.249 - 2.183\,da' + 3.751\,da'' + 25.301\,dc - 1.051\,dt & dc &= +0.014\\
\triangle T &= -1^h\,13^m\,19^s.119 + dt. & & -0.349 - 0.638\,da' - 1.092\,da'' - 1.051\,dc + 15.679\,dt & dt &= +0.016
\end{aligned}
$$

$a' = +0^s.739$ (circle east); $a'' = +0^s\,289$ (circle west); $c = 0^s.531$ (+ with circle east).

Chronometer No. 1254, at $3^h\,38^m.1$ chron. time, $1^h\,13^m\,19^s.118 \pm 0^s.046$ fast, losing $0^s.053$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889. Jan. 12	ν Piscium . .	W.	7	2 48 45.021	−0.275	+0.207	+0.131	−0.553	−0.100	44.431	1 35 38.526	−1 13 5.905	−0.047
	ξ Piscium .		7	3 0 54.410	−0.271	+0.039	+0.151	−0.551	−0.090	53.788	1 47 47.844	5.944	−0.008
	γ Androm. .		7	3 10 11.890	−0.350	+0.119	0.273	−0.738	−0.082	10.556	1 57 4.645	5.911	−0.041
	α Arietis		7	3 14 1.204	−0.307	+0.130	−0.038	−0.598	−0.079	0.312	2 0 54.389	5.923	−0.029
	55 Cassiop. .		7	3 18 54.864	−0.476	+0.244	−0.952	−1.345	−0.075	52.260	2 5 46.454	[5.706]	. .
	γ Trianguli		7	3 23 49.441	−0.328	+0.216	−0.155	−0.659	−0.070	48.445	2 10 42.459	5.986	+0.034
	θ Arietis . .		7	3 25 3.323	−0.300	+0.239	−0.001	−0.584	−0.069	2.608	2 11 56.539	6.069	+0.017
	ι Cassiop.	W.	7	3 33 4.164	−0.486	+0.390	−1.001	−1.404	−0.062	1.601	2 19 55.261	−1 13 [6.340]	.
	ε Arietis	E.	7	4 5 56.916	+0.303	−0.345	−0.019	+0.547	−0.034	57.368	2 52 51.592	−1 13 5.776	−0.176
	α Aurigæ		7	6 21 34.908	+0.363	+0.174	−0.391	+0.734	+0.079	35.867	5 8 29.835	[6.032]	. .
	β Tauri		7	6 32 21.916	+0.318	+0.050	−0.111	+0.581	+0.080	22.834	5 19 16.816	6.028	+0.076
	σ Orionis		7	6 46 15.531	+0.263	+0.022	+0.226	+0.511	+0.101	16.654	5 33 10.757	5.897	−0.065
	α Columbæ .		7	6 48 43.157	+0.204	+0.015	+0.587	+0.617	+0.116	44.696	5 35 38.680	6.016	+0.064
	δ Leporis		7	6 59 38.137	+0.232	+0.007	+0.417	+0.547	+0.125	39.465	5 46 30.488	6.023	+0.071
	μ Geminorum . .	E.	7	7 29 20.107	+0.306	−0.020	−0.038	+0.553	+0.129	21.095	6 16 15.150	−1 13 5.945	−0.007

NORMAL EQUATIONS.

$$
\begin{aligned}
\text{Assuming}\quad a' &= +0^s.611 + da' \quad \text{circle W.} & 0 &= +0.270 + 2.275\,da' + 2.959\,dc - 0.328\,dt & \text{whence } da' &= -0^s.079\\
a'' &= +0.616 + da'' \quad \text{" E.} & & +0.064 + 1.862\,da'' + 1.546\,dc - 0.559\,dt & da'' &= -0.009\\
c &= +0.561 + dc \quad \text{" E.} & & +0.840 + 2.959\,da' + 1.546\,da'' + 19.587\,dc - 0.559\,dt & dc &= -0.029\\
\triangle T &= -1^h\,13^m\,5^s.963 + dt. & & -0.042 - 0.328\,da' + 1.398\,da'' - 0.559\,dc + 13.200\,dt & dt &= 0.000
\end{aligned}
$$

$a' = +0^s.531$ (circle west); $a'' = +0^s.606$ (circle east); $c = 0^s.531$ (+ with circle east).

Chronometer No. 1254, at $4^h\,46^m.9$ chron. time, $1^h\,13^m\,5^s.952 \pm 0^s.009$ fast; losing $0^s.051$ per hour.

Transits of stars observed at Vera Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 15	ν Piscium	E.	7	2 48 40.311	+0.275	−0.047	+0.101	+0.381	−0.038	40.983	1 35 38.490	−1 13 2.493	+0.197
	ο Piscium		7	2 52 32.943	+0.281	−0.107	+0.076	+0.385	−0.035	33.685	1 39 31.162	2.377	+0.081
	ι Arietis		7	3 0 27.456	+0.299	−0.206	0.000	+0.402	−0.029	27.922	1 47 25.642	2.280	−0.016
	β Arietis		7	3 1 31.563	+0.302	−0.222	−0.008	+0.405	−0.028	32.012	1 48 29.784	2.228	−0.068
	50 Cassiop.		7	3 6 59.543	+0.552	−0.211	−1.051	+1.225	−0.027	0.031	1 53 57.504	[2.527]	. .
	γ Androm.		7	3 10 6.448	+0.350	−0.264	−0.212	+0.511	−0.022	6.811	1 57 4.588	2.223	−0.073
	α Arietis		7	3 13 56.151	+0.307	−0.233	−0.029	+0.413	−0.019	56.600	2 0 54.347	2.253	−0.046
	γ Trianguli		7	3 23 44.338	+0.328	−0.255	−0.120	+0.456	−0.015	44.732	2 10 42.408	2.324	+0.028
	ι Cassiop.		7	3 32 57.370	+0.486	−0.383	−0.775	+0.971	−0.004	57.663	2 19 55.130	[2.533]	. .
	ξ² Ceti	E.	7	3 35 16.543	+0.280	−0.225	+0.081	+0.385	−0.001	17.053	2 22 14.922	−1 13 2.131	−0.155
	35 Arietis	W.	7	3 49 59.398	−0.315	−0.268	−0.069	−0.473	+0.009	58.282	2 36 55.862	−1 13 2.420	+0.134
	μ Ceti		7	3 51 59.076	−0.283	−0.244	+0.074	−0.427	+0.010	58.206	2 38 55.999	2.207	−0.089
	47 Cephei, H.		7	4 4 29.114	−0.745	−0.656	−1.994	−2.200	+0.020	23.539	2 51 22.606	[1.933]	. .
	α Ceti		7	4 9 31.238	−0.273	−0.266	+0.118	−0.422	+0.024	30.419	2 56 28.268	2.151	−0.145
	ρ Persei		7	4 11 7.276	−0.341	−0.333	−0.185	−0.536	+0.025	5.906	2 58 3.569	2.337	+0.041
	δ Arietis		7	4 18 19.890	−0.300	−0.308	−0.001	−0.446	+0.070	18.905	3 5 16.599	2.306	+0.010
	ζ Arietis		7	4 21 34.269	−0.302	−0.316	−0.012	−0.449	+0.033	33.223	3 8 31.000	2.223	−0.073
	ο Tauri		7	4 31 53.030	−0.281	0.000	+0.081	−0.426	+0.041	52.445	3 18 50.165	2.280	−0.016
	ξ Tauri		7	4 34 12.004	−0.282	+0.013	+0.076	−0.426	+0.044	11.429	3 21 8.997	2.432	+0.136
	f Tauri		7	4 37 47.506	−0.288	+0.033	+0.052	−0.431	+0.048	46.920	3 24 44.459	2.461	.
	Gr. 716	W.	7	4 45 36.314	−0.449	+0.089	−0.667	−0.923	+0.055	34.419	3 32 32.013	−1 13 [2.406]	

NORMAL EQUATIONS.

Assuming
$a' = +0^s.441 + da'$ circle E.
$a'' = +0.437 + da''$ " W.
$c = +0.438 + dc$ " E.
$\triangle T = -1^h\,13^m\,2^s.293 + dt.$

$$\left\{\begin{aligned} 0 &= -0.152 + 2.496\,da' - 3.199\,dc - 1.203\,dt \\ &\quad +0.098 + 2.612\,da'' + 2.789\,dc + 1.146\,dt \\ &\quad +0.909 - 3.199\,da' + 2.789\,da'' + 27.095\,dc - 0.706\,dt \\ &\quad +0.018 - 1.203\,da' + 1.146\,da'' - 0.706\,dc + 17.852\,dt \end{aligned}\right\}$$

whence
$da' = -0^s.030$
$da'' = +0.004$
$dc = -0.037$
$dt = -0.005$

$a' = +0^s.411$ (circle east); $a'' = +0^s.441$ (circle west); $c = 0^s.401$ (+ with circle east).

Chronometer No. 1254, at $3^h\,38^m.4$ chron. time, $1^h\,13^m\,2^s.296 \pm 0^s.016$ fast, losing $0^s.046$ per hour.

Transits of stars observed at Vera Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Jan. 16	β Arietis	W.	7	3 1 31.719	−0.271	+0.022	−0.009	−0.504	−0.047	30.920	1 48 29.771	−1 13 1.149	−0.040
	50 Cassiop. . . .		7	3 7 1.307	−0.551	+0.352	−1.113	−1.622	−0.044	58.329	1 53 57.443	[0.886]	. . .
	α Arietis . .		7	3 13 56.500	−0.307	+0.167	−0.031	−0.544	−0.038	55.744	2 0 54.333	1.411	+0.222
	θ Arietis		7	3 25 58.430	−0.300	+0.135	−0.001	−0.534	−0.029	57.701	2 11 56.488	1.213	+0.024
	ι Cassiop.		7	3 32 58.871	−0.486	+0.187	−0.835	−1.285	−0.023	56.429	2 19 55.085	[1.344]	. . .
	ξ Ceti		7	3 35 16.664	−0.280	+0.107	+0.087	−0.509	−0.020	16.049	2 22 14.902	1.147	−0.042
	ν Arietis		7	3 45 32.220	−0.304	+0.107	−0.019	−0.541	−0.010	31.453	2 32 30.320	1.133	−0.054
	35 Arietis		7	3 49 57.950	−0.315	+0.109	−0.069	−0.566	−0.009	57.110	2 36 55.848	1.262	+0.073
	μ Ceti	.	7	3 51 57.820	−0.283	+0.097	+0.074	−0.511	−0.007	57.191	2 38 55.987	1.204	+0.015
	41 Arietis . . .	W.	7	3 56 28.674	−0.314	+0.105	−0.065	−0.564	−0.002	27.834	2 43 26.594	−1 13 1.240	+0.051
	47 Cephei, H. .	E.	7	4 4 21.764	+0.745	0.000	−1.899	+2.423	+0.003	23.036	2 51 22.511	−1 13 [0.525]	. . .
	α Ceti	.	7	4 9 28.513	+0.273	−0.003	+0.112	+0.464	+0.007	29.366	2 56 28.256	1.110	−0.079
	ρ Persei	.	7	4 11 4.006	+0.341	−0.005	−0.176	+0.592	+0.008	4.766	2 58 3.553	1.213	+0.024
	δ Arietis . . .		7	4 18 16.974	+0.300	−0.009	−0.001	+0.492	+0.014	17.770	3 5 16.587	1.183	−0.006
	ζ Arietis . .		7	4 21 31.437	+0.302	−0.013	−0.011	+0.496	+0.017	32.228	3 8 30.988	1.240	+0.051
	ο Tauri	.	7	4 31 50.470	+0.281	−0.024	+0.077	+0.469	+0.025	50.298	3 18 50.154	1.144	−0.045
	ξ Tauri .	.	7	4 34 9.373	+0.282	−0.027	+0.072	+0.470	+0.027	10.197	3 21 8.986	1.211	+0.022
	σ Persei	.	7	4 35 45.300	+0.369	−0.032	−0.296	+0.688	+0.029	46.058	3 22 44.949	1.109	−0.080
	f Tauri . .	.	7	4 37 44.943	+0.288	−0.033	+0.050	+0.475	+0.030	45.753	3 24 44.447	1.306	+0.117
	ε Eridani . . .		7	4 40 42.076	+0.251	−0.031	+0.206	+0.470	+0.033	43.005	3 27 41.878	1.122	−0.067
	Gr. 716		7	4 45 32.671	+0.449	−0.071	−0.635	+1.017	+0.037	33.994	3 32 31.983	[2.011]	.
	17 Tauri	E.	7	4 51 17.267	+0.308	−0.062	−0.036	+0.506	+0.041	18.024	3 38 16.905	−1 13 1.119	−0.070

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming } a' = +0^s.391 + da' \text{ circle W.} & 0 = -0.099 + 2.204\,da' \qquad\qquad + 2.824\,dc - 0.848\,dt & & \text{whence } da' = +0^s.052 \\
a'' = +0.383 + da'' \quad \text{" E.} & \quad -0.111 \qquad + 3.307\,da'' - 3.528\,dc - 0.942\,dt & & da'' = +0.037 \\
c = +0.490 + dc \quad \text{" E.} & \quad +0.160 + 2.824\,da' - 3.528\,da'' + 28.692\,dc + 2.442\,dt & & dc = -0.006 \\
\triangle T = -1^h\,13^m\,1^s.181 + dt. & \quad +0.121 - 0.848\,da' - 0.942\,da'' + 2.442\,dc + 18.852\,dt & & dt = -0.001
\end{array}
$$

$a' = +0^s.443$ (circle west); $a'' = +0^s.420$ (circle east); $c = 0^s.484$ (+ with circle east).

Chronometer No. 1254, at $4^h\,0^m.6$ chron. time, $1^h\,13^m\,1^s.189 \pm 0^s.013$ fast, losing $0^s.049$ per hour.

Transits of stars observed at Vera Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Jan. 17	55 Cassiop.	E.	7	3 18 45.450	+0.476	—0.053	—0.443	+1.389	—0.044	46.775	2 5 46.239	—1 13 [0.536]	+0.022
	θ Arietis	.	7	3 24 55.550	+0.320	—0.036	—0.001	+0.598	—0.038	56.373	2 11 56.474	—1 12 59.899	+0.021
	o^2 Ceti (Var.) . . .	.	7	3 26 42.740	+0.261	—0.032	+0.096	+0.565	—0.036	43.594	2 13 43.696	59.898	+0.004
	ξ^2 Ceti		7	3 35 13.944	+0.280	—0.037	+0.049	+0.570	—0.029	14.777	2 22 14.896	59.881	. . .
	36 H. Cassiop. . .	.	7	3 40 28.168	+0.559	—0.080	—0.650	+1.861	—0.022	29.836	2 27 29.543	—1 13 [0.293]	. . .
	ν Arietis	.	7	3 45 29.423	+0.304	—0.044	—0.011	+0.606	—0.018	30.268	2 32 30.307	—1 12 59.953	+0.076
	δ Ceti		7	3 46 46.026	+0.267	—0.040	+0.082	+0.565	—0.017	46.886	2 33 47.115	59.771	—0.008
	35 Arietis	.	7	3 49 55.000	+0.315	—0.049	—0.038	+0.635	—0.014	55.849	2 36 55.834	—1 13 0.015	+0.138
	μ Ceti	E.	7	3 51 55.153	+0.283	—0.045	+0.041	+0.572	—0.012	55.992	2 38 55.974	—1 13 0.018	+0.141
	47 Cephei, H. . . .	W.	7	4 4 26.521	—0.745	—0.118	—2.826	—3.160	0.000	19.671	2 51 22.444	—1 12 [57.277]	. . .
	α Ceti		7	4 9 28.703	—0.273	+0.008	+0.167	—0.605	+0.004	28.004	2 56 28.244	59.760	—0.117
	ρ Persei	.	7	4 11 4.584	—0.341	+0.020	—0.262	—0.771	+0.006	3.336	2 58 3.536	59.800	—0.077
	β Persei		7	4 13 57.656	—0.347	+0.045	—0.099	—0.795	+0.009	56.269	3 0 56.546	59.723	—0.154
	δ Arietis	.	7	4 18 17.146	—0.300	+0.080	—0.001	—0.641	+0.013	16.297	3 5 16.574	59.723	—0.154
	ζ Arietis	.	7	4 21 31.623	—0.302	+0.175	—0.017	—0.647	+0.016	30.848	3 8 30.976	59.872	—0.005
	o Tauri	.	7	4 31 50.563	—0.281	+0.227	+0.116	—0.611	+0.025	50.039	3 18 50.143	59.896	+0.019
	ξ Tauri		7	4 34 9.396	—0.282	+0.238	+0.108	—0.612	+0.027	8.866	3 21 8.975	59.920	+0.043
	f Tauri		7	4 37 44.933	—0.288	+0.268	+0.074	—0.620	+0.031	44.398	3 24 44.435	59.963	+0.086
	Gr. 716		7	4 45 33.777	—0.449	+0.488	—0.945	—1.326	+0.039	31.584	3 32 31.953	[59.531]	. .
	17 Tauri	W.	7	4 51 17.563	—0.308	+0.354	—0.069	—0.661	+0.044	16.923	3 38 16.985	—1 12 59.938	+0.061

NORMAL EQUATIONS.

Assuming

$$
\begin{aligned}
a' &= +0^{s}.132 + da' \text{ circle E.} \\
a'' &= +0.405 + da'' \quad \text{“ W.} \\
c &= +0.586 + dc \quad \text{“ E.} \\
\triangle T &= -1^{h}\,12^{m}\,59^{s}.860 + dt.
\end{aligned}
\quad
\left\{
\begin{aligned}
0 = &-0.275 + 2.439\,da' \qquad\qquad\; - 1.853\,dc - 0.491\,dt \\
&-0.553 \qquad\qquad + 2.567\,da'' + 3.177\,dc - 0.414\,dt \\
&-0.414 - 1.853\,da' + 3.177\,da'' + 25.174\,dc - 2.243\,dt \\
&-0.143 - 0.491\,da' - 0.414\,da'' - 2.243\,dc + 16.766\,dt
\end{aligned}
\right\}
\text{ whence }
\begin{aligned}
da' &= +0^{s}.115 \\
da'' &= +0.220 \\
dc &= -0.001 \\
dt &= +0.017
\end{aligned}
$$

$a' = +0^{s}.247$ (circle east); $a'' = +0^{s}.625$ (circle west); $c = 0^{s}.585$ (+ with circle east.)

Chronometer No. 1254, at $4^{h}\,4^{m}.9$ chron. time, $1^{h}\,12^{m}\,59^{s}.877 \pm 0^{s}.047$ fast, losing $0^{s}.057$ per hour.

Transits of stars observed at Coatzacoalcos, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Feb. 10	α Orionis	E.	7	6 54 41.857	+0.280	−0.229	−0.013	+0.228	−0.083	42.040	5 49 9.926	−1 5 32.114	−0.157
	66 Orionis		7	7 4 38.863	+0.275	−0.225	−0.017	+0.226	−0.072	39.050	5 59 6.736	32.312	+0.033
	ν Orionis		7	7 6 46.238	+0.292	−0.239	−0.004	+0.233	−0.069	46.453	6 1 14.346	32.107	−0.174
	η Geminorum		7	7 13 43.221	+0.305	−0.248	+0.006	+0.244	−0.061	43.467	6 8 10.939	32.528	+0.247
	β Canis Majoris		7	7 23 51.157	+0.240	−0.193	−0.044	+0.237	−0.049	21.348	6 17 49.143	32.200	+0.076
	ν Geminorum		7	7 27 54.656	+0.301	−0.241	+0.003	+0.240	−0.043	54.916	6 22 22.644	32.268	+0.013
	ε Geminorum		7	7 42 38.656	+0.310	−0.242	+0.010	+0.249	−0.023	38.960	6 37 6.530	32.430	+0.149
	24 H. Camelop.		3	7 49 24.968	+0.654	−0.505	+0.276	+1.104	−0.016	26.587	6 43 54.828	[31.659]	.
	δ Geminorum	E.	7	8 19 1.957	+0.305	−0.214	+0.005	+0.244	+0.020	2.317	7 13 30.130	−1 5 32.187	−0.094
	σ Hydræ	W.	7	9 38 30.663	−0.274	−0.044	+0.070	−0.266	+0.113	30.262	8 32 58.125	−1 5 32.127	−0.144
	ζ Hydræ		7	9 55 4.936	−0.279	−0.025	+0.057	−0.267	+0.136	4.558	8 49 32.264	32.294	+0.013
	θ Hydræ		7	10 14 8.711	−0.271	−0.002	+0.080	−0.266	+0.162	8.414	9 8 36.094	32.320	+0.039
	ι Draconis		7	10 26 53.850	−0.883	+0.043	−1.769	−1.868	+0.177	49.196	9 21 19.153	[30.043]	. . .
	Gr. 1564		7	10 38 20.272	0.515	+0.050	−0.636	−0.768	+0.191	28.594	9 32 46.472	[32.122]	. . .
	ε Leonis	W.	7	10 45 6.586	−0.309	+0.039	−0.027	−0.290	+0.200	6.199	9 39 43.728	−1 5 32.471	+0.190

NORMAL EQUATIONS.

Assuming $a' = +0^s.111 + da'$ circle E.; $a'' = +0.190 + da''$ " W.; $c = +0.207 + dc$ " E.; $\triangle T = -1^h 5^m 32^s.281 + dt$.

$$\left\{\begin{array}{l} 0 = +0.286 + 1.482\,da' \qquad\qquad - 0.459\,dc + 0.521\,dt \\ -0.126 \qquad\qquad + 2.926\,da'' + 1.610\,dc - 0.108\,dt \\ -0.958 - 0.459\,da' + 1.610\,da'' - 18.511\,dc + 2.735\,dt \\ -0.071 + 0.521\,da' - 0.108\,da'' + 3.735\,dc + 12.323\,dt \end{array}\right\}$$

whence $da' = -0^s.184$; $da'' = +0.091$; $dc = +0.038$; $dt = +0.003$

$a' = -0^s.072$ (circle east); $a'' = +0^s.281$ (circle west); $c = 0^s.246$ (+ with circle east).

Chronometer No. 1254, at $8^h 2^m.9$ chron. time, $1^h 5^m 32^s.281 \pm 0^s.079$ fast, losing $0^s.074$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 12	19 H. Camelop.	E.	7	6 9 46.986	+0.727	+0.362	−2.108	+2.142	−0.045	48.064	5 4 17.569	−1 5[30.495]	. . .
	α Orionis		7	6 54 39.723	+0.280	−0.045	+0.086	+0.407	−0.029	40.423	5 49 9.900	30.523	+0.208
	η Leporis		7	6 56 50.848	+0.246	−0.039	+0.252	+0.417	−0.028	51.692	5 51 21.196	30.496	+0.181
	δ Urs. Minoris	.	6	7 13 13.877	+1.218	−0.195	+7.455	−6.844	−0.025	15.485	6 7 56.730	[30.755]	. . .
	8 Monocerotis		7	7 23 23.020	+0.276	−0.044	+0.107	+0.406	−0.019	23.746	6 17 53.493	30.253	−0.062
	ν Geminorum		7	7 27 52.123	+0.301	−0.048	−0.018	+0.431	−0.018	52.771	6 22 22.626	30.145	−0.170
	α Canis Minoris		7	7 45 45.468	+0.242	−0.039	+0.270	+0.422	−0.011	46.352	6 40 16.026	30.326	+0.011
	ε Canis Majoris		7	7 59 45.893	+0.220	−0.092	+0.380	+0.462	−0.006	46.857	6 54 16.583	30.274	−0.041
	ζ Geminorum	E.	7	8 3 1.621	+0.302	−0.145	−0.022	+0.433	−0.005	2.184	6 57 31.944	−1 5 30.190	−0.125
	25 Camelop.	W.	7	8 13 20.814	−0.737	+1.114	−1.174	−3.467	−0.002	17.546	7 7 47.142	−1 5[30.404]	. . .
	λ Geminorum		7	8 17 13.856	−0.295	+0.434	+0.004	−0.464	0.000	13.537	7 11 43.303	30.232	−0.073
	δ Geminorum	.	7	8 19 0.640	−0.304	+0.447	−0.013	−0.482	0.000	0.288	7 13 30.118	30.170	−0.145
	ρ Geminorum		7	8 27 29.540	−0.324	+0.469	−0.047	−0.526	+0.003	29.081	7 21 58.818	30.263	−0.052
	α² Geminorum		7	8 33 2.457	−0.324	+0.501	−0.048	−0.527	+0.005	2.066	7 27 31.667	30.399	+0.085
	25 Monocerotis		7	8 37 16.566	−0.263	+0.425	+0.063	−0.447	+0.007	16.351	7 31 46.051	30.300	−0.023
	α Canis Minoris		7	8 39 0.550	−0.278	+0.460	+0.036	−0.448	+0.007	0.317	7 33 30.061	30.256	−0.055
	κ Geminorum		7	8 43 15.970	−0.309	+0.534	−0.021	−0.491	+0.008	15.691	7 37 45.329	30.362	+0.048
	β Geminorum		7	8 44 2.711	−0.316	+0.533	−0.033	−0.506	+0.010	2.417	7 38 31.996	30.421	+0.107
	53 Camelop.		7	8 57 46.357	−0.425	+0.418	−0.230	−0.909	+0.014	45.217	7 52 14.765	[30.450]	. .
	χ Geminorum		7	9 2 16.628	−0.316	+0.310	−0.033	−0.505	+0.015	13.099	7 56 42.663	30.436	+0.122
	3 Urs. Majoris, H.	W.	7	9 7 19.564	−0.496	+0.497	−0.357	−1.233	+0.019	17.994	8 1 47.162	−1 5[30.832]	. . .

NORMAL EQUATIONS.

Assuming $a' = +0^s.462 + da'$ circle E.; $a'' = +0.102 + da''$ " W.; $c = +0.414 + dc$ " E.; $\triangle T = -1^h 5^m 30^s.320 + dt$.

$$\left\{\begin{array}{l} 0 = +0.022 + 5.080\,da' \qquad\qquad - 1.454\,dc + 2.192\,dt \\ -0.303 \qquad\qquad + 3.814\,da'' + 4.623\,dc - 1.797\,dt \\ -0.613 - 1.455\,da' + 4.623\,da'' + 28.166\,dc - 3.944\,dt \\ +0.140 + 2.192\,da' - 1.797\,da'' - 3.944\,dc + 16.729\,dt \end{array}\right\}$$

whence $da' = -0^s.006$; $da'' = +0.065$; $dc = +0.011$; $dt = +0.002$

$a' = +0^s.456$ (circle east); $a'' = +0^s.167$ (circle west); $c = 0^s.425$ (+ with circle east).

Chronometer No. 1254, at $8^h 18^m.6$ chron. time, $1^h 5^m 30^s.315 \pm 0^s.046$ fast, losing $0^s.021$ per hour.

Transits of stars observed at Coatzacoalcos, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads	Flexure and inequality of pivots	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Feb. 13	π⁵ Orionis . . .	W.	7	5 53 57.840	−0.271	−0.217	+0.221	+0.293	−0.049	57.817	4 48 28.038	−1 5 29.779	+0.006
	10 Camelop. .		7	5 59 3.164	−0.423	−0.340	−1.032	+0.592	−0.044	2.368	4 53 32.808	[29.560]	. .
	ε Ursi. Minoris, S.P.		7	6 2 42.178	−0.381	−0.306	+5.537	−2.162	−0.039	48.250	4 57 19.273	[28.977]	
	α Aurigæ . . .	W.	7	6 13 59.863	−0.360	−0.288	−0.510	+0.411	−0.027	58.089	5 8 29.372	−1 5 29.717	−0.056
	ε Orionis	E.	7	6 36 4.720	+0.283	−0.176	+0.232	−0.333	−0.001	4.725	5 30 34.942	−1 5 29.783	+0.010
	α Orionis . . .		7	6 54 39.601	+0.280	−0.142	+0.129	−0.335	+0.020	39.553	5 49 9.887	29.666	−0.107
	δ Aurigæ		7	6 55 54.371	+0.391	−0.191	−0.693	−0.570	+0.021	53.329	5 50 23.602	29.727	−0.046
	θ Aurigæ .		7	6 57 39.540	+0.336	−0.159	−0.281	−0.418	+0.025	39.043	5 52 9.361	29.682	−0.091
	ν Orionis . . .	E.	7	7 6 44.304	+0.292	−0.017	+0.041	−0.343	+0.034	44.311	6 1 14.308	−1 5 30.013	+0.240

NORMAL EQUATIONS.

Assuming
$a' = +\overset{s.}{0}.629 + da'$ circle W.
$a'' = +0.632 + da''$ " E.
$c = -0.252 + dc$ " E.
$\triangle T = -1^h\,5^m\,29^s.798 + dt.$

$$\left\{\begin{array}{l} 0 = -0.235 + 3.149\,da' + 2.655\,dc - 0.652\,dt \\ \quad -0.078 + 0.840\,da'' - 0.807\,dc - 0.438\,dt \\ \quad +0.374 + 2.655\,da' - 0.807\,da'' + 12.700\,dc + 2.223\,dt \\ \quad -0.022 - 0.652\,da' - 0.438\,da'' + 2.223\,dc + 6.940\,dt \end{array}\right\}$$

whence
$da' = +\overset{s.}{0}.134$
$da'' = +0.054$
$dc = -0.061$
$dt = +0.038$

$a' = +0^s.763$ (circle west); $a'' = +0^s.686$ (circle east); $c = 0^s.313$ (— with circle east).

Chronometer No. 1254, at $6^h\,37^m.2$ chron. time, $1^h\,5^m\,29^s.773 \pm 0^s.026$ fast, losing $0^s.069$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads	Flexure and inequality of pivots	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 14	γ Tauri	W.	7	5 18 57.193	−0.293	−0.216	+0.009	−0.364	−0.050	56.279	4 13 28.238	−1 5 28.001	−0.039
	δ Tauri		7	5 22 0.669	−0.296	−0.247	+0.003	−0.367	−0.047	59.715	4 16 31.640	28.075	+0.035
	ε Tauri		7	5 27 36.828	−0.299	−0.293	−0.003	−0.371	−0.042	35.820	4 22 7.768	28.052	−0.012
	m Persei	.	7	5 31 5.570	−0.350	−0.416	−0.107	−0.478	−0.036	4.183	4 25 36.040	28.143	+0.097
	Gr. 848 . . .		7	5 39 25.893	−0.616	−0.900	−0.644	−1.425	−0.027	22.281	4 33 54.587	[27.695]	. . .
	α Camelop. . . .		7	5 48 31.246	−0.468	−0.677	−0.345	−0.868	−0.018	28.860	4 43 0.900	[27.960]	. . .
	i Tauri . .		7	5 50 21.720	−0.298	−0.431	−0.002	−0.370	−0.015	20.604	4 44 52.644	27.960	−0.080
	π⁵ Orionis . .	.	7	5 53 56.890	−0.271	−0.392	+0.054	−0.351	−0.011	55.919	4 48 28.008	27.911	−0.129
	ι Aurigæ	W.	7	5 55 15.043	−0.326	−0.471	+0.057	−0.418	−0.010	13.875	4 49 45.744	−1 5 28.131	+0.091
	ι Tauri .	E.	7	6 1 55.494	+0.303	−0.770	−0.022	+0.334	−0.003	55.336	4 56 27.498	−1 5 27.838	−0.212
	11 Orionis . . .		7	6 3 41.428	+0.293	−0.810	+0.018	+0.332	−0.002	41.249	4 58 13.434	27.815	−0.225
	17 Camelop. .		7	6 25 9.286	+0.442	+0.032	−0.551	+0.684	+0.022	9.918	5 19 41.521	[28.397]	. . .
	Gr. 966		7	6 30 21.557	+0.597	+0.010	−1.146	+1.199	+0.028	22.245	5 24 54.517	[27.728]	. . .
	α Leporis		7	6 33 17.487	+0.240	−0.002	+0.219	+0.327	+0.032	18.303	5 27 50.226	28.077	+0.037
	ζ Tauri		7	6 36 28.136	+0.303	−0.010	−0.019	+0.333	+0.035	28.778	5 31 0.683	28.095	+0.055
	σ Orionis		7	6 38 37.883	+0.265	−0.013	+0.126	+0.311	+0.038	38.610	5 33 10.478	28.132	+0.092
	130 Tauri . . .	.	7	6 46 25.504	+0.297	−0.028	+0.003	+0.326	+0.046	26.148	5 40 57.922	28.226	+0.186
	Orionis	E.	7	6 54 37.328	+0.280	−0.039	+0.031	+0.314	+0.055	37.972	5 49 9.874	−1 5 28.098	+0.058

NORMAL EQUATIONS.

Assuming
$a' = +\overset{s.}{0}.500 + da'$ circle E.
$a'' = +0.378 + da''$ " W.
$c = +0.328 + dc$ " E.
$\triangle T = -1^h\,5^m\,28^s.061 + dt.$

$$\left\{\begin{array}{l} 0 = +0.876 + 2.817\,da' + 3.691\,dc - 1.269\,dt \\ \quad +0.066 + 2.689\,da'' - 1.606\,dc + 0.168\,dt \\ \quad +1.047 + 3.691\,da' - 1.606\,da'' + 23.446\,dc - 0.140\,dt \\ \quad -0.497 - 1.269\,da' + 0.168\,da'' - 0.140\,dc + 14.865\,dt \end{array}\right\}$$

whence
$da' = -\overset{s.}{0}.312$
$da'' = -0.023$
$dc = +0.003$
$dt = +0.007$

$a' = +0^s.188$ (circle west); $a'' = +0^s.346$ (circle east); $c = 0^s.331$ (+ with circle east).

Chronometer No. 1254, at $6^h\,4^m.9$ chron. time, $1^h\,5^m\,28^s.040 \pm 0^s.020$ fast, losing $0^s.067$ per hour.

Transits of stars observed at Coatzacoalcos, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v*.
1889.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Feb. 15	γ Tauri	E.	7	5 18 54.344	+0.293	−0.141	+0.027	+0.618	−0.034	55.103	4 13 28.221	−1 5 26.882	+0.121
	δ Tauri		7	5 21 57.665	+0.296	−0.162	+0.008	+0.625	−0.026	58.506	4 16 31.623	26.883	+0.122
	ε Tauri	.	7	5 27 33.904	+0.299	−0.204	−0.008	+0.631	−0.021	34.601	4 22 7.751	26.850	+0.089
	α Tauri	.	7	5 34 58.934	+0.294	−0.254	+0.028	+0.622	−0.015	59.608	4 29 32.790	26.818	+0.057
	Gr. 848		7	5 39 20.821	+0.616	−0.594	−1.850	+2.423	−0.014	21.459	4 33 54.510	[26.949]	. . .
	μ Eridani	.	7	5 45 22.758	+0.264	−0.293	+0.199	+0.598	−0.005	23.515	4 39 56.908	26.607	−0.154
	α Camelop.	.	7	5 48 27.081	+0.468	−0.557	−0.992	+1.477	−0.003	27.505	4 43 0.855	[26.850]	. . .
	i Tauri	.	7	5 50 18.717	+0.298	−0.349	−0.005	+0.629	−0.001	19.289	4 44 52.628	26.661	−0.100
	π^5 Orionis		7	5 53 54.067	+0.271	−0.352	+0.156	+0.598	+0.001	54.737	4 48 28.008	26.729	−0.032
	ι Aurigæ	E.	7	5 55 11.933	+0.326	−0.400	−0.165	+0.711	+0.002	12.407	4 49 45.726	−1 5 26.681	−0.080
	17 Camelop.	W.	7	6 25 10.743	−0.442	+0.298	−0.957	−1.402	+0.028	8.268	5 19 41.484	−1 5 [26.784]	. . .
	Gr. 966		7	6 30 25.307	−0.597	+0.483	−1.991	−2.459	+0.032	20.775	5 24 54.451	26.324	. . .
	φ^1 Orionis	.	7	6 34 11.123	−0.283	+0.253	+0.095	−0.646	+0.036	10.578	5 28 43.603	26.975	+0.214
	ζ Tauri	.	7	6 36 28.241	−0.303	+0.340	−0.034	−0.683	+0.038	27.599	5 31 0.668	26.931	+0.170
	130 Tauri	.	7	6 46 25.368	−0.297	+0.357	+0.005	−0.669	+0.047	24.811	5 40 57.909	26.902	+0.141
	κ Orionis		7	6 47 56.613	−0.254	+0.313	+0.292	−0.646	+0.048	56.366	5 42 29.645	26.721	−0.040
	α Orionis		7	6 54 36.938	−0.280	+0.373	+0.116	−0.643	+0.053	36.567	5 49 9.861	26.706	−0.055
	ν Orionis		7	7 6 41.358	−0.292	+0.488	+0.037	−0.658	+0.063	40.996	6 1 14.281	26.717	−0.044
	η Geminorum	.	7	7 13 38.454	−0.305	−0.098	−0.051	−0.690	+0.070	37.380	6 8 10.880	26.500	−0.261
	ν Geminorum	W.	7	7 27 50.178	−0.301	−0.061	−0.024	−0.675	+0.082	49.199	6 22 22.589	−1 5 26.610	−0.151

NORMAL EQUATIONS.

Assuming $a' = +0^s.522 + da'$ circle E.
$a'' = +0.709 + da''$ " W.
$c = +0.536 + dc$ " E.
$\triangle T = -1^h\,5^m\,26^s.762 + dt.$

$$\left\{\begin{aligned} 0 &= +0.156 + 2.644\,da' \qquad\qquad - 2.510\,dc - 0.478\,dt \\ & \quad +0.163 \qquad\qquad + 2.435\,da'' + 2.032\,dc - 0.230\,dt \\ & \quad -1.774 - 2.510\,da' + 2.032\,da'' + 24.796\,dc + 0.031\,dt \\ & \quad -0.101 - 0.478\,da' - 0.230\,da'' + 0.031\,dc + 16.868\,dt \end{aligned}\right\}$$

whence $da' = +0^s.017$
$da'' = -0.093$
$dc = +0.081$
$dt = +0.005$

$a' = +0^s.540$ (circle east); $a'' = +0^s.617$ (circle west); $c = 0^s.617$ (+ with circle east).

Chronometer No. 1254, at $6^h\,20^m.9$ chron. time, $1^h\,5^m\,26^s.761 \pm 0^s.023$ fast, losing $0^s.052$ per hour.

Transits of stars observed at Coatzacoalcos, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
1889. Feb. 16	γ Eridani	E.	7	4 58 15.267	+0.247	0.000	+0.252	+0.439	−0.056	16.143	3 52 50.615	−1 5 25.534	+0.164
	ν Tauri	.	7	5 2 39.453	+0.288	0.000	+0.048	+0.436	−0.051	40.194	3 57 14.634	25.560	+0.190
	o^1 Eridani	.	7	5 11 51.113	+0.258	−0.030	−0.195	+0.430	−0.036	51.570	4 6 26.434	25.136	−0.234
	γ Tauri		7	5 18 52.926	+0.293	−0.074	+0.023	+0.441	−0.035	53.574	4 13 28.204	25.370	0.000
	δ Tauri	.	7	5 21 56.373	+0.296	−0.096	+0.007	+0.446	−0.032	56.894	4 16 31.606	25.288	−0.082
	ε Tauri	.	7	5 27 32.440	+0.299	−0.131	−0.007	+0.450	−0.026	33.025	4 22 7.734	25.289	−0.081
	α Tauri		7	5 34 57.506	+0.294	−0.170	+0.023	+0.444	−0.018	58.079	4 29 58.043	25.305	−0.065
	Gr. 848		7	5 39 19.314	+0.616	−0.398	−1.560	+1.729	−0.013	19.688	4 33 54.437	[25.251]	. . .
	4 Camelop. . . .	E.	7	5 44 10.407	+0.400	−0.386	−0.517	+0.773	−0.009	10.728	4 38 45.216	−1 5 [25.512]	. . .
	i Tauri . . .	W.	7	5 50 18.717	−0.298	+0.046	−0.004	−0.491	−0.002	17.968	4 44 52.612	−1 5 25.356	−0.014
	10 Camelop. . .		7	5 59 0.022	−0.423	+0.097	−0.649	−0.940	+0.006	58.113	4 53 32.712	[25.410]	.
	ι Tauri	.	7	6 1 53.586	−0.303	+0.077	−0.029	−0.500	+0.010	52.841	4 56 27.465	25.376	+0.006
	11 Orionis		7	6 3 39.490	−0.293	+0.079	+0.025	−0.482	+0.011	38.830	4 58 13.402	25.428	+0.058
	19 H. Camelop. .	.	7	6 9 47.736	−0.727	+0.233	−2.220	−2.465	+0.018	42.574	5 4 17.180	[25.394]	. . .
	τ Orionis	.	7	6 17 38.718	−0.258	+0.083	+0.205	−0.470	+0.026	38.304	5 12 12.921	25.383	+0.013
	γ Orionis . . .		7	6 24 36.447	−0.278	+0.089	+0.099	−0.470	+0.033	35.920	5 19 10.581	25.349	−0.021
	χ Aurigæ . .		7	6 30 56.417	−0.325	+0.105	−0.100	−0.550	+0.039	55.588	5 25 30.274	25.314	−0.056
	φ^1 Orionis		7	6 34 9.576	−0.283	+0.091	+0.074	−0.472	+0.043	9.029	5 28 43.590	25.439	+0.069
	ζ Tauri	.	7	6 36 26.696	−0.303	+0.097	−0.026	−0.499	+0.045	26.010	5 31 0.653	25.357	−0.013
	130 Tauri . . .	W.	7	6 46 23.964	−0.297	+0.095	+0.004	−0.489	+0.056	23.333	5 40 57.896	−1 5 25.437	+0.067

NORMAL EQUATIONS.

Assuming
$a' = +\overset{s.}{0}.429 + da'$ circle E.
$a'' = +0.478 + da''$ " W.
$c = +0.413 + dc$ " E.
$\triangle T = -1^h\,5^m\,25^s.379 + dt.$

$$\left\{\begin{array}{l} 0 = -0.019 + 2.476\,da' - 1.343\,dc + 0.283\,dt \\ \quad -0.077 + 2.486\,da'' + 2.319\,dc - 0.347\,dt \\ \quad -0.757 - 1.343\,da' + 2.319\,da'' + 24.527\,dc - 2.096\,dt \\ \quad -0.086 + 0.283\,da' - 0.347\,da'' - 2.096\,dc + 17.055\,dt \end{array}\right\}$$

whence
$da' = +\overset{s.}{0}.025$
$da'' = +0.002$
$dc = +0.033$
$dt = +0.009$

$a' = +0^s.454$ (circle east); $a'' = +0^s.480$ (circle west); $c = 0^s.446$ (+ with circle east).

Chronometer No. 1254, at $5^h\,52^m.6$ chron. time, $1^h\,5^m\,25^s.370 \pm 0^s.017$ fast, losing $0^s.062$ per hour.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Mar. 12	31 Lyncis .	E.	7	9 24 0.650	+0.347	0.000	—0.351	—0.096	—0.138	0.412	8 15 14.748	—1 8 45.664	—0.141
	o Urs. Majoris		7	9 29 49.618	+0.414	+0.033	—0.808	—0.145	—0.127	48.985	8 21 3.275	[45.710]	. .
	η Cancri .		7	9 35 3.600	+0.301	+0.112	—0.048	—0.074	—0.115	3.776	8 26 17.896	45.880	+0.094
	Gr. 1460 . . .		7	9 39 50.921	+0.376	+0.208	—0.553	—0.116	—0.103	50.733	8 31 4.707	[46.026]	. .
	σ Hydræ . . .		7	9 41 43.230	+0.277	+0.178	+0.119	—0.070	—0.099	46.635	8 32 57.951	45.684	—0.102
	γ Cancri . .		7	9 45 37.761	+0.304	+0.244	—0.059	—0.075	—0.090	38.085	8 36 52.265	45.820	+0.037
	δ Cancri . .		7	9 47 8.601	+0.298	+0.259	—0.024	—0.074	—0.086	8.974	8 38 23.116	45.858	+0.075
	ε Hydræ . .		7	9 49 39.720	+0.281	+0.271	+0.090	—0.071	—0.080	40.211	8 40 54.420	45.791	+0.008
	σ² Cancri (Med.)		7	9 51 14.517	+0.319	+0.273	—0.165	—0.082	—0.076	14.776	8 47 28.908	45.868	+0.085
	α Cancri .		7	10 1 10.993	+0.289	+0.084	—0.038	—0.071	—0.053	11.204	8 52 25.537	45.667	—0.116
	σ² Urs. Majoris .	E.	7	10 9 25.550	+0.463	+0.016	—1.137	—0.183	—0.010	24.699	9 0 38.868	—1 8 [45.831]	. .
	83 Cancri . .	W.	7	10 21 34.001	—0.297	—0.286	—0.010	+0.031	—0.005	33.434	9 12 47.818	—1 8 45.616	—0.168
	1 Draconis, H.		7	10 30 6.828	—0.821	—0.635	—1.735	+0.211	+0.015	3.853	9 21 18.333	[45.520]	. . .
	10 Leonis Minoris .		7	10 36 12.443	—0.328	—0.211	—0.120	+0.037	+0.029	11.850	9 27 26.200	44.650	—0.133
	o Leonis . . .		7	10 44 0.367	—0.286	—0.145	+0.028	+0.031	+0.047	59.974	9 35 14.286	45.688	—0.095
	ε Leonis . .		7	10 48 19.947	—0.307	—0.106	—0.042	+0.033	+0.057	19.582	9 39 33.758	45.824	+0.041
	π Leonis . .		7	11 3 7.710	—0.281	—0.031	+0.036	+0.030	+0.092	7.556	9 54 21.610	45.940	+0.157
	η Leonis .		7	11 10 3.704	—0.296	—0.020	—0.005	+0.031	+0.108	3.622	10 1 17.705	45.917	+0.134
	α Leonis		7	11 11 14.461	—0.289	—0.016	+0.018	—0.031	+0.111	14.274	10 2 28.395	45.879	+0.096
	32 Urs. Majoris .	W.	7	11 18 46.877	—0.446	0.000	—0.499	+0.073	+0.129	46.134	10 10 0.048	—1 8 [46.086]	. .

NORMAL EQUATIONS.

Assuming

$$\begin{aligned}
a' &= +0^s.544 + da' \text{ circle E.} \\
a'' &= +0.330 + da'' \quad \text{“ W.} \\
c &= -0.114 + dc \quad \text{“ E.} \\
\triangle T &= -1^h\,8^m\,45^s.779 + dt.
\end{aligned}
\qquad
\left\{\begin{aligned}
0 &= +0.039 + 3.004\,da' \qquad\qquad\qquad - 1.685\,dc - 2.334\,dt \\
& \quad -0.079 \qquad\qquad + 2.922\,da'' + 3.616\,dc - 1.446\,dt \\
& \quad -1.411 - 1.685\,da' + 3.616\,da'' + 26.412\,dc + 2.628\,dt \\
& \quad +0.033 - 2.334\,da' + 1.446\,da'' + 2.628\,dc + 16.497\,dt
\end{aligned}\right\}
\text{ whence }
\begin{aligned}
da' &= +0^s.008 \\
da'' &= -0.060 \\
dc &= +0.064 \\
dt &= -0.016
\end{aligned}$$

$a' = +0^s.552$ (circle east); $a'' = +0^s.271$ (circle west); $c = 0^s.050$ (— with circle east).

Chronometer No. 1254, at $10^h\,15^m.3$ chron. time, $1^h\,8^m\,45^s.783 \pm 0^s.018$ fast, losing $0^s.141$ per hour.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Mar. 13	β Canis Minoris . .	W.	7	8 29 50.890	−0.284	−0.091	+0.049	+0.183	−0.134	50.613	7 21 8.120	−1 8 42.493	+0.012
	α² Geminorum .		7	8 36 14.208	−0.321	−0.109	−0.117	+0.216	−0.119	13.758	7 27 31.297	42.461	−0.020
	25 Monocerotis		7	8 40 28.500	−0.266	−0.104	+0.124	+0.183	−0.108	28.329	7 31 45.714	42.615	+0.134
	α Canis Minoris .		7	8 42 12.466	−0.280	−0.110	+0.067	+0.184	−0.106	12.221	7 33 29.747	42.474	−0.007
	κ Geminorum . .		7	8 46 27.876	−0.308	−0.124	−0.059	+0.201	−0.094	27.492	7 37 45.012	42.480	+0.001
	β Geminorum . .		7	8 47 14.469	−0.314	−0.126	−0.086	+0.207	−0.092	14.058	7 38 31.664	42.394	−0.087
	Gr. 1374		7	8 55 38.728	−0.550	−0.220	−1.126	+0.673	−0.086	37.419	7 46 55.111	[42.308]	. . .
	ω¹ Cancri . . .		7	9 2 56.101	−0.309	−0.109	−0.066	+0.203	−0.054	55.766	7 54 13.239	42.527	+0.046
	χ Geminorum . .		7	9 5 25.220	−0.314	−0.108	−0.085	+0.207	−0.046	24.874	7 56 42.385	42.489	+0.008
	3 Urs. Majoris, H. .		7	9 10 30.264	−0.475	−0.158	−0.790	+0.506	−0.035	29.312	8 1 46.960	[42.352]	
	ζ¹ Cancri . . .	W.	7	9 14 33.874	−0.297	−0.095	−0.012	+0.192	−0.025	33.637	8 5 51.120	−1 8 42.517	+0.036
	σ Hydræ . . .	E.	7	9 41 39.910	+0.277	+0.267	+0.108	−0.223	+0.039	40.378	8 32 57.941	−1 8 42.436	−0.045
	γ Cancri . . .		7	9 45 34.413	+0.304	+0.281	−0.054	−0.239	+0.050	34.755	8 36 52.265	42.490	+0.009
	δ Cancri .		7	9 47 5.177	+0.298	+0.268	−0.022	−0.235	+0.056	5.542	8 38 23.104	42.448	−0.033
	ι Cancri .		7	9 48 41.511	+0.315	+0.282	−0.129	−0.255	+0.057	41.781	8 39 59.354	42.427	−0.054
	ε Hydræ		7	9 49 36.454	+0.281	+0.246	+0.082	−0.224	+0.060	36.899	8 40 54.410	42.489	−0.007
	σ² Cancri (med.).		7	9 56 11.094	+0.319	+0.255	−0.150	−0.260	+0.076	11.334	8 47 28.897	42.437	−0.044
	ζ Hydræ . . .		7	9 58 14.164	+0.280	+0.213	+0.086	−0.224	+0.081	14.600	8 49 32.126	42.474	−0.006
	83 Cancri . . .		7	10 21 29.969	+0.297	+0.220	−0.019	−0.234	+0.137	30.370	9 12 47.809	42.561	−0.020
	h Urs. Majoris . .		7	10 31 30.557	+0.430	+0.363	−0.829	−0.500	+0.161	30.182	9 22 47.855	[42.327]	.
	Gr. 1564 .		7	10 41 29.621	+0.485	+0.418	−1.167	−0.644	+0.185	28.898	9 32 46.330	[42.568]	.
	o Leonis . .		7	10 43 56.260	+0.286	+0.264	+0.051	−0.227	+0.192	56.726	9 35 14.278	42.448	−0.033
	ε Leonis . .	E.	7	10 48 15.743	+0.308	+0.297	−0.078	−0.244	+0.202	16.228	9 39 33.752	−1 8 42.476	+0.005

NORMAL EQUATIONS.

Assuming

$$
\begin{array}{lll}
a' = +\overset{s.}{0.139} + da' & \text{circle W.} & 0 = +0.165 + 1.904\,da' \qquad\qquad + 3.656\,dc - 1.217\,dt \\
a'' = +0.608 + da'' & \text{" E.} & -0.101 \qquad\qquad + 2.365\,da'' - 3.012\,dc - 1.291\,dt \\
c = -0.042 + dc & \text{" E.} & +3.350 + 3.656\,da' - 3.012\,da'' + 28.962\,dc + 1.350\,dt \\
\triangle T = -1^{h}\,8^{m}\,42^{s}.486 + dt. & & +0.008 - 1.217\,da' - 1.291\,da'' + 1.350\,dc + 19.916\,dt
\end{array}
$$

whence

$$
\begin{array}{l}
da' = +\overset{s.}{0.222} \\
da'' = -0.161 \\
dc = -0.160 \\
dt = +0.013
\end{array}
$$

$a' = +0^{s}.361$ (circle west); $a'' = +0^{s}.502$ (circle east); $c = 0^{s}.203$ (− with circle east).

Chronometer No. 1254, at $9^{s}\ 25^{m}.0$ chron. time, $1^{h}\ 8^{m}\ 42^{s}.481 \pm 0.005$ fast, losing $0^{s}.146$.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Mar. 14	β Canis Minoris . .	E.	7	8 29 46.774	+0.284	+0.045	+0.038	+0.004	−0.130	47.015	7 21 8.106	−1 8 38.909	−0.015
	α² Geminorum . .		7	8 36 9.970	+0.321	+0.045	−0.091	+0.005	−0.114	10.136	7 27 31.279	38.857	−0.067
	α Canis Minoris . .	.	7	8 42 8.338	+0.280	+0.036	+0.052	+0.004	−0.099	8.611	7 33 29.732	38.879	−0.045
	κ Geminorum . .		7	8 46 23.587	+0.308	+0.036	−0.045	+0.004	−0.088	23.802	7 37 44.995	38.807	−0.117
	π Geminorum . .	.	7	8 48 59.934	+0.324	+0.036	−0.101	+0.005	−0.081	0.217	7 40 21.257	38.960	−0.036
	Gr. 1374 . .	.	7	8 55 34.200	+0.550	+0.130	−0.870	+0.014	−0.064	33.960	7 46 55.045	[38.915]	. . .
	ω¹ Cancri		7	9 2 51.865	+0.309	+0.105	−0.051	+0.004	−0.047	52.185	7 54 13.222	38.963	+0.039
	χ Geminorum . .	.	7	9 5 21.076	+0.314	+0.120	−0.038	+0.004	−0.040	21.436	7 56 42.369	39.067	+0.143
	3 Urs. Majoris, H .	E.	7	9 10 25.893	+0.475	+0.198	−0.611	+0.011	−0.027	25.939	8 1 46.913	−1 8[39.026]	. . .
	ο Urs. Majoris	W.	7	9 29 43.284	−0.414	+0.211	−0.923	−0.091	+0.019	42.086	8 21 3.219	−1 8[38.867]	. . .
	η Cancri . . .	.	7	9 34 57.091	−0.301	+0.147	−0.055	−0.047	+0.034	56.869	8 26 17.870	38.999	+0.065
	σ Hydræ	.	7	9 41 36.745	−0.277	+0.129	+0.073	−0.044	+0.051	36.677	8 32 57.931	38.746	−0.178
	γ Cancri	.	7	9 45 31.487	−0.304	+0.131	−0.068	−0.047	+0.061	31.260	8 36 52.239	39.021	+0.097
	δ Cancri		7	9 47 2.190	−0.298	+0.127	−0.028	−0.046	+0.065	2.010	8 38 23.093	38.917	−0.007
	ι Cancri	.	7	9 48 38.571	−0.315	+0.132	−0.163	−0.050	+0.068	38.243	8 39 59.333	38.910	−0.014
	ε Hydræ		7	9 49 33.394	−0.281	+0.017	+0.103	−0.044	+0.071	33.260	8 40 54.399	38.861	−0.063
	σ² Cancri		7	9 56 8.137	−0.319	+0.123	−0.189	−0.051	+0.087	7.788	8 47 28.886	38.902	−0.022
	ζ Hydræ	.	7	9 58 11.053	−0.280	+0.105	+0.108	−0.044	+0.092	11.034	8 49 32.116	38.918	−0.006
	α Cancri . . .	W.	7	10 1 4.667	−0.289	+0.104	+0.044	−0.045	+0.100	4.581	8 52 25.516	−1 8 39.065	+0.141

NORMAL EQUATIONS.

Assuming $a' = +0^s.222 + da'$ circle E.; $a'' = +0.497 + da''$ " W.; $c = -0.068 + dc$ " E.; $\Delta T = -1^h 8^m 38^s.936 + dt$.

$$\left\{\begin{aligned} 0 &= +0.213 + 1.858\,da' - 1.392\,dc - 1.882\,dt \\ &\quad -0.282 + 1.090\,da'' + 1.419\,dc + 0.377\,dt \\ &\quad -2.212 - 3.192\,da' + 1.419\,da'' + 24.024\,dc - 1.449\,dt \\ &\quad -0.019 - 1.882\,da' + 0.377\,da'' - 1.449\,dc + 16.749\,dt \end{aligned}\right\}$$

whence $da' = +0^s.057$; $da'' = +0.135$; $dc = +0.092$; $dt = +0.012$

$a' = +0^s.279$ (circle east); $a'' = +0^s.632$ (circle west); $c = 0^s.024$ (+ with circle east).

Chronometer No. 1254, at $9^h\,21^m.4$ chron. time, $1^h\,8^m\,38^s.924 \pm 0^s.015$ fast, losing $0^s.151$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Mar. 16	25 Camelop. . . .	E.	7	8 16 14.186	+0.879	+0.080	−1.221	+0.202	−0.724	13.402	7 7 43.284	−1 8[30.118]	. . .
	λ Geminorum . .	.	7	8 20 13.764	+0.295	+0.004	−0.001	+0.027	0.711	14.378	7 11 42.898	30.480	+0.012
	δ Geminorum . .		7	8 22 0.494	+0.304	0.000	−0.019	+0.028	−0.706	0.101	7 13 29.699	30.402	−0.066
	ρ Leonis		7	11 35 29.065	+0.285	0.000	+0.019	+0.026	−0.174	29.221	10 26 58.822	30.399	−0.069
	41 Leonis Minoris .	.	7	11 45 54.011	+0.306	+0.002	−0.025	+0.028	−0.146	54.176	10 37 23.669	30.507	+0.039
	46 Leonis Minoris .	.	7	11 55 37.461	+0.327	+0.007	−0.067	+0.032	−0.119	37.641	10 47 7.176	30.465	−0.003
	α Urs. Majoris . .	.	7	12 5 24.961	+0.422	+0.010	−0.265	+0.056	−0.092	25.092	10 56 54.319	[30.773]	. . .
	χ Leonis	.	7	12 7 48.547	+0.283	+0.007	+0.025	+0.026	−0.085	48.803	10 59 18.300	30.503	+0.035
	p³ Leonis	.	7	12 9 45.511	+0.275	+0.007	+0.040	+0.026	−0.072	45.787	11 1 15.371	30.416	−0.052
	θ Leonis	E.	7	12 17 55.996	+0.294	+0.009	0.000	+0.027	−0.057	56.269	11 8 25.769	−1 8 30.500	+0.032
	ι Leonis	W.	7	12 26 40.000	−0.287	−0.121	+0.016	−0.067	−0.037	39.504	11 18 9.097	−1 8 30.407	−0.061
	τ Leonis	.	7	12 30 45.336	−0.289	−0.122	+0.040	−0.066	−0.022	44.877	11 22 14.610	30.267	−0.201
	λ Draconis	.	7	12 33 22.657	−0.487	−0.207	−0.429	−0.192	−0.015	21.327	11 24 51.185	[30.142]	. . .
	ξ Hydræ	.	7	12 36 4.354	−0.224	−0.095	+0.157	−0.077	−0.007	4.108	11 27 33.734	30.374	−0.094
	η Virginis . .	.	7	13 22 45.137	−0.283	−0.154	+0.051	−0.066	+0.120	44.805	12 14 14.519	30.286	−0.182
	6 Canum Venat. .	.	7	13 29 55.034	−0.337	−0.105	−0.094	−0.086	+0.140	54.552	12 20 24.043	30.509	+0.041
	20 Comæ	.	7	13 32 40.583	−0.303	−0.063	−0.018	−0.071	+0.148	40.276	12 24 9.648	30.628	+0.160
	24 Comæ (seq.) . .	.	7	13 38 5.507	−0.299	−0.009	−0.010	−0.070	+0.162	5.281	12 29 34.638	30.643	+0.175
	76 Urs. Majoris . .		7	13 45 16.486	−0.428	+0.101	−0.297	−0.147	+0.182	15.897	12 36 44.983	[30.914]	. . .
	31 Comæ Berenecis	W.	7	13 54 49.298	−0.314	+0.176	−0.043	−0.075	+0.208	49.250	12 46 18.555	−1 8 30.695	+0.227

NORMAL EQUATIONS.

Assuming $a' = +0^s.257 + da'$ circle E.; $a'' = +0.228 + da''$ " W.; $c = +0.058 + dc$ " E.; $\Delta T = -1^h 8^m 30^s.468 + dt$.

$$\left\{\begin{aligned} 0 &= +0.108 + 1.815\,da' - 13.435\,dc - 0.953\,dt \\ &\quad +0.166 + 3.223\,da'' + 2.160\,dc - 0.496\,dt \\ &\quad +0.094 - 3.435\,da' + 2.160\,da'' + 25.927\,dc - 0.590\,dt \\ &\quad +0.062 - 0.953\,da' - 0.496\,da'' - 0.590\,dc + 16.934\,dt \end{aligned}\right\}$$

whence $da' = -0^s.086$; $da'' = -0.045$; $dc = -0.011$; $dt = -0.010$

$a' = +0^s.171$ (circle east); $a'' = +0^s.182$ (circle west); $c = 0^s.046$ (+ with circle east).

Chronometer No. 1254, at $12^h\,38^m.9$ chron. time, $1^h\,8^m\,30^s.468 \pm 0^s.020$ fast, losing $0^s.168$ per hour.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Mar. 17	σ Urs. Majoris	W.	7	10 9 6.771	—0.463	—0.149	—0.409	—0.281	—0.122	5.327	9 0 38.725	—1 8[26.602]	
	θ Hydræ		7	10 17 3.328	—0.276	—0.046	+0.046	—0.107	—0.100	2.845	9 8 35.972	26.873	—0.002
	83 Cancri	.	7	10 21 15.251	—0.297	—0.047	—0.008	—0.112	+0.090	14.696	9 12 47.769	26.928	+0.057
	h Urs. Majoris	.	7	10 31 16.086	—0.430	—0.076	—0.328	—0.240	—0.066	14.946	9 22 47.769	[27.177]	.
	10 Leonis Minoris	.	7	10 35 53.610	—0.331	—0.067	—0.088	—0.134	—0.048	52.942	9 27 26.145	26.797	—0.074
	ο Leonis	.	7	10 43 41.594	—0.286	—0.077	+0.020	—0.109	—0.030	41.112	9 35 14.246	26.866	—0.005
	ε Leonis		7	10 48 1.170	—0.308	—0.099	—0.031	—0.117	—0.018	0.597	9 39 33.724	26.873	—0.002
	μ Leonis	W.	7	10 54 55.151	—0.311	—0.120	—0.040	—0.119	—0.001	54.560	9 46 27.762	—1 8 26.798	—0.073
	π Leonis	E.	7	11 2 48.008	+0.281	+0.045	+0.038	+0.068	+0.020	48.460	9 54 21.580	—1 8 26.880	+0.009
	η Leonis		7	11 9 44.143	+0.296	+0.043	—0.006	+0.070	+0.039	44.585	10 1 17.682	26.903	+0.032
	α Leonis	.	7	11 10 54.813	+0.289	+0.041	+0.019	+0.068	+0.042	54.272	10 2 28.376	26.896	+0.025
	λ Hydræ		7	11 13 37.747	+0.255	+0.034	+0.138	+0.068	+0.049	38.291	10 5 11.443	26.848	—0.023
	ζ Leonis	.	7	11 18 58.343	+0.264	+0.031	—0.043	+0.073	+0.063	58.731	10 10 31.772	26.959	+0.088
	γ^1 Leonis	.	7	11 22 18.537	+0.301	+0.031	—0.023	+0.071	+0.072	18.989	10 13 51.953	27.039	+0.168
	35 H. Urs. Majoris	.	7	11 43 36.564	+0.594	—0.124	—0.666	+0.193	+0.129	36.690	10 35 9.377	[26.313]	. .
	l Leonis	.	7	11 51 52.574	+0.287	—0.138	+0.026	+0.068	+0.151	52.968	10 43 26.225	26.743	—0.128
	α Urs. Majoris		7	12 5 21.364	+0.422	—0.244	—0.447	+0.144	+0.187	21.426	10 56 54.315	[27.111]	. .
	χ Leonis	E.	7	12 7 44.697	+0.283	—0.178	+0.041	+0.067	+0.193	45.103	10 59 18.301	—1 8 26.802	—0.069

NORMAL EQUATIONS.

Assuming
$a' = +0^s.155 + da'$ circle W.
$a'' = +0.348 + da''$ " E.
$c = +0.106 + dc$ " E.
$\triangle T = -1^h\,8^m\,26^s.880 + dt.$

$$\left\{\begin{array}{l} 0 = -0.021 + 2.303\,da' \qquad\qquad + 3.245\,dc - 1.485\,dt \\ \quad +0.205 \qquad\qquad + 2.321\,da'' - 1.976\,dc - 0.385\,dt \\ \quad +0.150 + 3.245\,da' - 1.976\,da'' + 22.621\,dc + 1.729\,dt \\ \quad -0.015 + 1.485\,da' + 0.385\,da'' + 1.729\,dc + 15.157\,dt \end{array}\right\}$$

whence
$da' = +0^s.044$
$da'' = -0.060$
$dc = -0.019$
$dt = +0.005$

$a' = +0^s.199$ (circle west); $a'' = +0^s.288$ (circle east); $c = 0^s.087$ (+with circle east).

Chronometer No. 1254, at 10 $55^m.0$ chron. time, $1^h\,8^m\,26^s.871 \pm 0^s.012$ slow, losing $0^s.160$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Mar. 18	25 Camelop.	E.	7	8 16 6.547	+0.879	+0.848	—3.193	+0.833	—0.133	5.691	7 7 42.928	—1 8[22.763]	
	ι Geminorum	.	7	8 27 12.920	+0.314	+0.188	—0.104	+0.121	—0.104	13.335	7 18 50.010	23.325	—0.047
	β Canis Minoris		7	8 29 30.854	+0.284	+0.151	+0.062	+0.108	—0.098	31.361	7 21 8.050	23.311	—0.061
	α^2 Geminorum		7	8 35 54.104	+0.321	+0.103	—0.145	+0.126	—0.081	54.428	7 27 31.207	23.221	—0.151
	α Canis Majoris	.	7	8 41 52.549	+0.280	+0.143	+0.083	+0.107	—0.066	53.096	7 33 29.672	23.424	+0.052
	κ Geminorum	.	7	8 46 7.784	+0.308	+0.183	—0.073	+0.118	—0.054	8.266	7 37 44.927	23.339	—0.033
	φ Geminorum	.	7	8 55 5.367	+0.312	+0.258	—0.095	+0.120	—0.031	5.931	7 46 42.464	23.467	+0.095
	53 Camelop.	.	7	9 0 37.308	+0.412	+0.397	—0.638	+0.218	—0.016	37.681	7 52 13.982	[23.699]	. .
	ω^1 Cancri	E.	7	9 2 35.993	+0.309	+0.318	—0.082	+0.119	—0.009	36.648	7 54 13.154	—1 8 23.494	+0.122
	3 Urs. Majoris	W.	7	9 10 10.664	—0.475	+0.764	—0.562	—0.406	+0.009	9.994	8 1 46.749	—1 8[23.248]	. . .
	ζ^1 Cancri		7	9 14 14.451	—0.297	+0.477	—0.008	—0.154	+0.019	14.488	8 5 51.050	23.438	+0.066
	30 Monocerotis		7	9 28 30.818	—0.267	—0.086	+0.087	—0.147	+0.059	30.464	8 20 7.237	23.227	—0.145
	η Cancri		7	9 34 41.546	—0.302	—0.062	—0.022	—0.157	+0.073	41.076	8 26 17.718	23.358	+0.014
	γ Cancri	.	7	9 45 16.026	—0.304	—0.011	—0.027	—0.158	+0.101	15.627	8 36 52.187	23.440	+0.068
	δ Cancri	.	7	9 46 46.784	—0.298	+0.005	—0.011	—0.155	+0.105	46.430	8 38 23.044	23.386	+0.014
	ι Cancri	.	7	9 48 23.168	—0.315	+0.015	—0.066	—0.168	+0.109	22.743	8 39 59.287	23.456	+0.084
	ε Hydræ	.	7	9 49 17.931	—0.281	+0.018	+0.042	—0.148	+0.111	17.673	8 40 54.354	23.319	—0.053
	ρ Urs. Majoris	W.	7	10 0 57.978	—0.467	+0.095	—0.567	—0.393	+0.142	56.788	8 52 33.234	—1 8[23.554]	. .

NORMAL EQUATIONS.

Assuming
$a' = +0^s.373 + da'$ circle E.
$a'' = +0.281 + da''$ " W.
$c = +0.073 + dc$ " E.
$\triangle T = -1^h\,8^m\,23^s.375 + dt.$

$$\left\{\begin{array}{l} 0 = -0.002 + 2.819\,da' \qquad\qquad - 3.946\,dc - 1.579\,dt \\ \quad -0.116 \qquad\qquad + 2.040\,da'' + 2.934\,dc - 1.078\,dt \\ \quad -0.914 - 3.946\,da' + 2.934\,da'' + 23.462\,dc - 0.005\,dt \\ \quad +0.163 - 1.579\,da' - 1.078\,da'' - 0.005\,dc + 14.899\,dt \end{array}\right\}$$

whence
$da' = +0^s.074$
$da'' = -0.024$
$dc = +0.054$
$dt = -0.001$

$a' = +0^s.447$ (circle east); $a'' = +0^s.257$ (circle west); $c = 0^s.127$ (+ with circle east).

Chronometer No. 1254, at $9^h\,6^m.9$ chron. time, $1^h\,8^m\,23^s.372 \pm 0^s.015$ fast, losing $0^s.158$ per hour.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Mar. 30	10 Leonis Minoris .	W.	7	10 35 15.748	−0.331	+0.106	+0.482	−0.156	−0.115	15.834	9 27 25.980	−1 7 49.854	−0.044
	Leonis .	.	7	10 43 4.616	−0.286	+0.091	−0.111	−0.127	−0.110	4.073	9 35 14.120	49.953	+0.055
	ε Leonis	.	7	10 47 23.867	−0.307	+0.099	+0.169	−0.137	−0.080	23.611	9 39 33.600	50.011	+0.113
	μ Leonis . . .	.	7	10 54 17.753	−0.313	+0.101	+0.219	−0.140	−0.064	17.556	9 46 27.640	49.916	+0.018
	π Leonis		7	11 2 11.774	−0.283	+0.091	−0.145	−0.126	−0.043	11.268	9 54 21.480	49.788	−0.110
	η Leonis . .		7	11 9 7.790	−0.296	+0.095	+0.023	−0.131	−0.025	7.456	10 1 17.586	49.870	−0.028
	α Leonis		7	11 10 18.578	−0.289	+0.093	−0.072	−0.128	−0.020	18.162	10 2 28.280	49.882	−0.016
	32 Urs. Majoris	W.	7	11 17 48.386	−0.446	+0.143	+2.010	−0.303	−0.002	49.738	10 9 59.710	−1 7[50.078]	. .
	γ¹ Leonis	E.	7	11 21 41.454	+0.300	−0.036	+0.098	+0.092	+0.008	41.916	10 13 51.870	−1 7 50.046	+0,148
	30 H. Urs. Majoris .	.	7	11 24 56.500	+0.449	−0.071	+2.342	+0.212	+0.017	59.459	10 16 8.978	[50.481]	. . .
	ρ Leonis		7	11 34 48.426	+0.285	−0.082	−0.137	+0.087	+0.043	48.622	10 26 58.760	49.862	−0.036
	41 Leonis Minoris .	.	7	11 45 13.047	+0.306	−0.133	+0.178	+0.094	+0.070	13.562	10 37 23.610	49.952	+0.054
	l Leonis . . .	.	7	11 51 15.876	+0.287	−0.149	−0.111	+0.087	+0.087	16.077	10 43 26.170	49.907	+0.009
	α Urs. Majoris .	.	7	12 4 41.957	+0.422	−0.338	+1.927	+0.185	+0.122	44.275	10 56 54.190	[50.085]	−0.011
	χ Leonis . . .		7	12 7 8.076	+0.300	−0.254	−0.178	+0.087	+0.129	8.160	10 59 18.273	49.887	
	p³ Leonis	E.	7	12 9 5.141	+0.275	−0.267	−0.291	+0.086	+0.153	5.097	11 1 15.340	−1 7 49.757	−0.141

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming } a' = -1^s.158 + da' \text{ circle W.} & 0 = -0.152 + 1.459\,da' + 1.962\,dc - 1.057\,dt & \text{whence } da' = +0^s.070 \\
a'' = -1.164 + da'' \text{ `` E.} & +0.092 + 1.986\,da'' + 2.151\,dc - 0.728\,dt & da'' = -0.077 \\
c = +0.074 + dc \text{ `` E.} & -0.583 + 1.962\,da' - 2.151\,da'' + 19.544\,dc - 0.606\,dt & dc = +0.032 \\
\triangle T = -1^h\,7^m\,49^s.914 + dt. & -0.152 - 1.057\,da' - 0.728\,da'' - 0.606\,dc + 13.929\,dt & dt = +0.016
\end{array}
$$

$a' = -1^s.087$ (circle west); $a'' = -1^s.241$ (circle east); $c = 0^s.106$ (+ with circle east).
Chronometer No. 1254, at $11^h\,18^m.6$ chron. time, $1^h\,7^m\,49^s.898 \pm 0^s.019$ fast, losing $0^s.160$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Mar. 31	l Leonis . . .	E.	7	11 51 11.694	+0.287	+0.043	+0.237	+0.205	−0.115	12.351	10 43 26.164	−1 7 46.187	+0.015
	46 Leonis Minoris .		7	11 54 53.710	+0.327	+0.052	−1.029	+0.245	−0.106	53.199	10 47 7.112	46.087	−0.085
	α Urs. Majoris .		7	12 4 43.600	+0.422	+0.054	−4.103	+0.433	−0.083	40.323	10 56 54.175	[46.148]	.
	χ Leonis . . .		7	12 7 3.686	+0.283	+0.032	+0.380	+0.203	−0.076	4.508	10 59 18.269	46.239	+0.057
	p³ Leonis . . .		7	12 9 0.381	+0.275	+0.029	+0.620	+0.201	−0.073	1.433	11 1 15.338	46.095	−0.077
	θ Leonis . . .		7	12 16 11.286	+0.294	+0.019	+0.005	+0.209	−0.055	11.758	11 8 25.749	46.009	−0.163
	ξ Urs. Majoris (med)		7	12 20 3.153	+0.321	+0.009	−0.858	+0.237	−0.045	2.617	11 12 16.594	46.123	−0.044
	σ Leonis		7	12 23 10.953	+0.281	0.000	+0.438	+0.203	−0.039	11.836	11 15 25.639	46.197	+0.025
	ι Leonis . . .		7	12 25 54.563	+0.287	−0.012	+0.234	+0.205	−0.031	55.246	11 18 9.094	46.152	−0.020
	τ Leonis		7	12 29 59.908	+0.276	−0.031	+0.580	+0.201	−0.022	0.912	11 22 14.608	46.304	+0.132
	λ Draconis . .	E.	7	12 32 42.536	+0.486	−0.077	−6.205	+0.586	−0.016	37.310	11 24 51.074	−1 7[46.236]	. . .
	3 Draconis . . .	W.	7	12 44 11.136	−0.461	+0.014	−5.100	−0.626	+0.011	4.974	11 36 19.177	−1 7[45.797]	. . .
	β Leonis . . .		7	12 51 11.447	−0.293	+0.004	+0.045	−0.250	+0.028	10.991	11 43 24.789	46.202	+0.030
	β Virginis .		7	12 52 41.617	−0.275	+0.044	+0.600	−0.241	+0.031	40.776	11 44 57.710	46.066	−0.106
	π Virginis . . .		7	13 2 58.251	−0.282	+0.069	+0.393	−0.243	+0.056	28.244	11 55 12.021	46.223	+0.051
	η Virginis . .		7	13 22 0.360	−0.272	+0.096	+0.703	−0.241	+0.101	0.747	12 14 14.602	46.145	−0.027
	α¹ Crucis .		7	13 28 9.290	−0.121	+0.466	+5.343	−0.521	+0.115	14.572	12 20 28.401	46.171	−0.001
	20 Comæ .		7	13 31 56.540	−0.303	+0.119	−0.252	−0.258	+0.125	35.971	12 24 9.751	46.220	+0.048
	76 Urs. Majoris		7	13 44 36.214	−0.428	+0.312	−4.107	−0.536	+0.155	31.611	12 36 45.121	[46.390]	. .
	31 Comæ Berenecis .		7	13 54 5.726	−0.314	+0.146	−0.592	−0.272	+0.181	4.875	12 46 18.677	46.198	+0.026
	δ Virginis .		7	13 57 47.446	−0.277	+0.133	+0.532	−0.241	+0.186	47.779	12 50 1.662	46.117	−0.055
	ε Virginis . .	W.	7	14 4 26.371	−0.288	+0.102	+0.207	−0.246	+0.202	26.348	12 56 40.087	−1 7 46.261	+0.089

NORMAL EQUATIONS.

$$
\begin{array}{llll}
\text{Assuming } a' = +2^s.546 + da' \text{ circle E.} & 0 = -0.154 + 2.381\,da' - 2.530\,dc - 0.813\,dt & \text{whence } da' = +0^s.091 \\
a'' = +2.543 + da'' \text{ `` W.} & +0.214 + 6.731\,da'' - 2.625\,dc + 1.698\,dt & da'' = -0.022 \\
c = +0.195 + dc \text{ `` E.} & -0.612 - 2.530\,da' - 2.625\,da'' + 30.180\,dc - 0.859\,dt & dc = +0.026 \\
\triangle T = -1^h\,7^m\,46^s.170 + dt. & +0.204 - 0.813\,da' - 1.698\,da'' - 0.859\,dc + 19.159\,dt & dt = 0.000
\end{array}
$$

$a' = +2^s.637$ (circle east); $a'' = +2^s.521$ (circle west); $c = 0^s.221$ (+ with circle east).
Chronometer No. 1254, at $12^h\,39^m.5$ chron. time, $1^h\,7^m\,46^s.172 \pm 0^s.011$ fast, losing $0^s.143$ per hour.

Transits of stars observed at Salina Cruz, Mexico, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Apr. 1	σ Hydræ .	E.	7	9 40 40.451	+0.277	−0.044	−0.219	+0.223	−0.106	40.582	8 32 57.680	−1 7 42.902	−0.134
	γ Cancri . . .	.	7	9 44 34.498	+0.304	0.013	+0.109	+0.239	−0.097	35.040	8 36 51.988	43.052	+0.016
	δ Cancri . .		7	9 46 5.450	+0.298	−0.005	+0.044	+0.235	−0.092	5.930	8 38 22.849	43.081	+0.045
	ι Cancri		7	9 47 41.374	+0.315	−0.009	+0.263	+0.255	−0.090	42.108	8 39 59.078	43.030	−0.006
	ε Hydræ . . .		7	9 48 36.833	+0.281	+0.014	−0.166	+0.225	−0.087	37.200	8 40 54.160	43.040	+0.004
	σ² Cancri (med.)		7	9 55 10.940	+0.319	+0.016	+0.304	+0.260	−0.072	11.767	8 47 28.630	43.147	+0.111
	ζ Hydræ . . .		7	9 57 14.680	+0.280	+0.012	−0.174	+0.225	−0.067	14.956	8 49 31.892	43.064	+0.028
	ρ Urs. Majoris .		7	10 0 12.421	+0.467	+0.016	+2.251	+0.596	−0.061	15.690	8 52 32.697	[42.993]	. .
	σ² Urs. Majoris .	E.	7	10 8 18.064	+0.463	0.000	+2.097	+0.585	−0.042	21.167	9 0 38.176	−1 7 [42.991]	.
	83 Cancri	W.	7	10 20 31.196	−0.297	+0.143	+0.048	−0.277	−0.014	30.799	9 12 47.592	−1 7 43.107	+0.071
	h Urs. Majoris .		7	10 30 29.086	−0.430	+0.200	+2.062	−0.590	+0.009	30.337	9 42 47.359	[42.978]	
	ο Leonis .		7	10 42 47.624	−0.286	+0.128	−0.127	−0.267	+0.038	57.110	9 35 14.097	43.013	−0.023
	ε Leonis		7	10 47 16.854	−0.307	+0.137	+0.194	−0.288	+0.048	16.638	9 39 33.575	43.063	+0.027
	μ Leonis . .		7	10 54 10.853	−0.311	+0.143	+0.251	−0.294	+0.065	10.701	9 46 27.615	43.086	+0.050
	π Leonis		7	11 2 4.957	−0.283	+0.134	−0.166	−0.266	+0.083	4.459	9 54 21.460	42.999	−0.037
	η Leonis		7	11 9 0.918	−0.296	+0.144	−0.026	−0.275	+0.099	0.564	10 1 17.567	42.997	−0.039
	α Leonis . . .		7	11 10 11.574	−0.289	+0.148	−0.082	−0.269	+0.102	11.184	10 2 28.259	42.925	−0.111
	36 Urs. Majoris . .	W.	7	11 31 14.543	−0.391	+0.203	+1.462	−0.477	+0.152	14.493	10 23 32.458	−1 7 [43.035]	. . .

NORMAL EQUATIONS.

$$\text{Assuming}\quad \begin{aligned} a' &= -1^s.013 + da' \quad \text{circle E.} \\ a'' &= -1.236 + da'' \quad \text{" W.} \\ c &= +0.265 + dc \quad \text{" E.} \\ \triangle T &= -1^h\,7^m\,43^s.035 + dt. \end{aligned} \quad \left\{ \begin{aligned} 0 = &-0.059 + 2.042\,da' - 3.070\,dc - 1.222\,dt \\ &+0.064 + 1.648\,da'' + 2.364\,dc - 1.209\,dt \\ &+0.502 - 3.070\,da' + 2.364\,da'' + 22.442\,dc - 0.179\,dt \\ &+0.036 - 1.222\,da' - 1.209\,da'' - 0.179\,dc + 15.296\,dt \end{aligned} \right\} \quad \text{whence}\ \begin{aligned} da' &= -0^s.005 \\ da'' &= -0.011 \\ dc &= -0.022 \\ dt &= -0.006 \end{aligned}$$

$a' = -1^s.018$ (circle east); $a'' = -1^s.247$ (circle west); $c = 0^s.243$ (+ with circle east).

Chronometer No. 1254, at $10^h\ 20^m.3$, chron. time, $1^h\ 7^m\ 43^s.036 \pm 0^s.012$ fast, losing $0^s.140$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
April 2	σ Hydræ . .	W.	7	9 40 38.420	−0.277	−0.079	−0.245	−0.343	−0.139	37.337	8 32 57.665	−1 7 39.672	+0.047
	γ Cancri		7	9 44 32.356	−0.304	−0.030	+0.122	−0.370	−0.129	31.645	8 36 51.972	39.673	+0.048
	ι Cancri . .		7	9 47 39.244	−0.298	+0.019	+0.294	−0.393	−0.118	38.748	8 39 59.062	39.686	+0.061
	σ² Cancri (med.)	.	7	9 55 8.730	−0.319	−0.011	+0.341	−0.400	−0.104	8.237	8 47 28.614	39.623	−0.002
	ζ Hydræ	.	7	9 57 12.570	−0.280	−0.015	−0.195	−0.346	−0.100	11.636	8 49 31.179	39.757	+0.132
	ρ Urs. Majoris . .		7	10 0 11.236	−0.467	−0.038	+2.515	−0.918	−0.093	12.235	8 52 32.644	[39.591]	. . .
	κ Cancri		7	10 9 24.908	−0.287	−0.046	−0.104	−0.349	−0.071	24.051	9 1 44.488	39.563	−0.062
	θ Hydræ		7	10 16 16.231	−0.276	−0.038	−0.263	−0.343	−0.055	15.256	9 8 35.758	39.498	−0.127
	h Urs. Majoris . .		7	10 30 26.071	−0.430	−0.017	+1.883	−0.770	−0.022	26.968	9 22 47.327	[39.641]	.
	10 Leonis Minoris .		7	10 35 5.844	−0.330	−0.031	+0.505	−0.428	−0.011	5.539	9 27 25.933	39.606	−0.019
	ο Leonis . .		7	10 42 54.546	−0.286	−0.022	−0.116	0.349	+0.006	53.779	9 35 14.085	39.694	+0.069
	μ Leonis	W.	7	10 54 7.556	−0.311	−0.015	+0.229	−0.383	+0.032	7.108	9 46 27.602	−1 7 39.506	−0.119
	π Leonis . . .	E.	7	11 2 0.866	+0.283	−0.270	−0.157	+0.306	+0.053	1.081	9 54 21.449	−1 7 39.632	+0.007
	η Leonis	.	7	11 8 56.663	+0.296	−0.282	+0.025	+0.317	+0.067	57.086	10 1 17.556	39.530	−0.095
	α Leonis . . .	.	7	11 10 7.483	+0.289	−0.276	−0.078	+0.310	+0.070	7.798	10 2 28.248	39.550	−0.075
	ζ Leonis	.	7	11 18 10.588	+0.307	−0.178	+0.176	+0.331	+0.088	11.312	10 10 31.650	39.662	+0.037
	γ¹ Leonis	.	7	11 21 30.776	+0.301	−0.156	+0.093	+0.323	+0.097	31.434	10 13 51.842	39.592	+0.033
	30 H. Urs. Majoris .	.	7	11 23 45.485	+0.449	−0.213	+2.229	+0.748	+0.101	48.799	10 16 8.899	[39.900]	
	ρ Leonis		7	11 34 37.800	+0.285	−0.088	−0.131	+0.307	+0.127	38.309	10 26 58.734	39.565	−0.060
	35 Urs. Majoris . .		7	11 42 44.514	+0.594	−0.067	+2.729	+0.872	+0.146	48.478	10 35 9.029	[39.449]	.
	41 Leonis .	E.	7	11 45 2.488	+0.300	−0.029	+0.170	+0.331	+0.151	3.411	10 37 23.589	−1 7 39.822	+0.197

NORMAL EQUATIONS.

$$\text{Assuming}\quad \begin{aligned} a' &= -1^s.227 + da' \quad \text{circle E.} \\ a'' &= -1.092 + da'' \quad \text{" W.} \\ c &= +0.375 + dc \quad \text{" E.} \\ \triangle T &= -1^h\,7^m\,39^s.618 + dt. \end{aligned} \quad \left\{ \begin{aligned} 0 = &-0.022 + 2.160\,da' + 3.420\,dc - 1.587\,dt \\ &+0.056 + 2.255\,da'' - 2.878\,dc - 1.117\,dt \\ &+0.777 + 3.420\,da' - 2.878\,da'' + 26.403\,dc - 3.530\,dt \\ &-0.042 - 1.587\,da' - 1.117\,da'' - 3.530\,dc + 18.077\,dt \end{aligned} \right\} \quad \text{whence}\ \begin{aligned} da' &= +0^s.088 \\ da'' &= -0.093 \\ dc &= -0.052 \\ dt &= -0.006 \end{aligned}$$

$a' = -1^s.139$ (circle west); $a'' = -1.185$ (circle east); $c = 0^s.323$ (+ with circle east).

Chronometer No. 1254, at $10^h\ 40^m.1$ chron. time, $1^h\ 7^m\ 39^s.625 \pm 0^s.014$ fast, losing $0^s.140$ per hour.

Transits of stars observed at Santiago de Cuba, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Nov. 28	ο Piscium . . .	E.	7	1 33 54.749	+0.280	−0.045	+0.014	+0.177	−0.202	54.973	1 39 34.656	+0 5 39.683	−0.100
	α Trianguli . .		7	1 41 8.384	+0.320	−0.051	−0.014	+0.200	−0.188	8.651	1 46 48.322	39.671	−0.088
	β Arietis		7	1 42 53.584	+0.302	−0.048	0.000	+0.186	−0.184	53.840	1 48 33.396	39.556	+0.027
	50 Cassiop.		7	1 48 23.930	+0.562	−0.089	−0.195	+0.563	−0.172	24.599	1 54 4.058	[39.459]	. . .
	ε Arietis	.	7	2 47 15.070	+0.303	−0.078	−0.001	+0.187	−0.056	15.425	2 52 55.097	39.672	−0.089
	δ Arietis	.	7	2 59 40.254	+0.300	−0.096	+0.001	+0.185	−0.031	40.613	3 5 20.110	39.497	+0.086
	ζ Arietis	.	7	3 2 54.566	+0.302	−0.101	−0.001	+0.187	−0.024	54.929	3 8 34.514	39.585	−0.002
	ο Tauri	.	7	3 13 13.571	+0.280	−0.109	+0.015	+0.177	−0.003	13.931	3 18 53.451	39.520	+0.063
	f Tauri . . .		7	3 19 7.930	+0.287	−0.123	+0.010	+0.179	+0.008	8.291	3 24 47.794	39.503	+0.080
	Gr. 716	E.	7	3 26 57.236	+0.455	−0.218	−0.115	+0.384	+0.024	57.766	3 32 37.409	+0 5[39.643]	. . .
	τ^6 Eridani .	W.	7	3 36 28.107	−0.224	+0.072	−0.157	−0.234	+0.042	28.606	3 42 7.149	+0 5 39.543	+0.040
	9 H. Camelop. .		7	3 42 6.650	−0.439	+0.133	+0.282	−0.441	+0.054	6.239	3 47 46.067	[39.828]	. . .
	ξ Persei	.	7	3 46 10.491	−0.335	+0.098	+0.069	−0.264	+0.062	10.121	3 51 49.554	39.433	+0.150
	λ Tauri . .		7	3 48 55.801	−0.287	+0.083	−0.029	−0.220	+0.068	55.416	3 54 35.008	39.592	−0.009
	ν Tauri . . .		7	3 51 38.954	−0.282	+0.079	−0.053	−0.216	+0.073	38.555	3 57 18.188	39.633	−0.050
	γ Tauri		7	4 7 52.499	−0.293	+0.074	−0.018	−0.223	+0.106	52.145	4 13 31.874	39.729	−0.146
	δ Tauri . . .		7	4 10 56.077	−0.296	+0.073	−0.010	−0.225	+0.112	55.731	4 16 35.305	39.574	+0.009
	ε Tauri		7	4 16 32.251	−0.299	+0.072	−0.004	−0.227	+0.123	31.916	4 22 11.448	39.532	+0.051
	α Tauri		7	4 23 57.100	−0.294	+0.068	−0.014	−0.224	+0.138	56.774	4 29 36.372	39.598	−0.015
	Gr. 848 . .	W.	7	4 28 25.520	−0.647	+0.146	+0.708	−0.873	+0.145	24.999	4 34 4.375	+0 5[39.376]	. . .

NORMAL EQUATIONS.

Assuming

$$a' = +\overset{s.}{0.076} + da' \text{ circle E.} \qquad a'' = -0.263 + da'' \text{ `` W.} \qquad c = +0.195 + dc \text{ `` E.} \qquad \triangle T = +0^h\,5^m\,39^s.586 + dt$$

$$\left\{\begin{array}{l} 0 = -0.003 + 1.999\,da' \qquad\qquad - 2.240\,dc - 0.635\,dt \\ \quad -0.153 \qquad\qquad + 2.830\,da'' + 1.675\,dc + 0.109\,dt \\ \quad -0.080 - 2.240\,da' + 1.675\,da'' + 25.151\,dc - 0.048\,dt \\ \quad -0.026 - 0.635\,da' + 0.109\,da'' - 0.048\,dc + 17.023\,dt \end{array}\right\}$$

whence $da' = +\overset{s.}{0.001}$, $da'' = +0.054$, $dc = 0.000$, $dt = -0.001$

$a' = +0^s.077$ (circle east); $a'' = -0^s.209$ (circle west); $c = 0^s.195$ (+ with circle east).

Chronometer 1254, at $3^h\ 15^m.1$ chron. time, $0^h\ 5^m\ 39^s.583 \pm 0^s.013$ slow, losing $0^s.120$ per hour.

Transits of stars observed at Santiago de Cuba, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
1889. Nov. 29	υ Piscium	W.	7	1 7 43.253	—0.315	—0.173	+0.025	—0.227	—0.120	42.443	1 13 24.717	+0 5 42.274	+0.083
	ψ Cassiop.	.	7	1 12 28.980	—0.500	—0.258	+0.376	—0.532	—0.111	27.955	1 18 10.571	[42.616]	. . .
	η Piscium	.	7	1 19 53.731	—0.293	—0.137	—0.018	—0.210	—0.096	52.977	1 25 35.331	42.354	+0.003
	40 Cassiop.		7	1 24 3.930	—0.572	—0.253	+0.514	—0.674	—0.088	2.857	1 29 45.095	[42.238]	.
	π Piscium	.	7	1 25 33.841	—0.285	—0.124	—0.029	—0.207	—0.084	33.112	1 31 15.531	42.419	—0.062
	o Piscium . .		7	1 33 52.944	—0.280	—0.114	—0.036	—0.205	—0.068	52.241	1 39 34.652	42.411	—0.054
	α Trianguli . . .		7	1 41 6.694	—0.320	—0.116	+0.035	—0.232	—0.054	6.007	1 46 48.317	42.310	+0.047
	β Arietis		7	1 42 51.650	—0.302	—0.105	+0.001	—0.216	—0.050	50.978	1 48 33.392	42.414	—0.057
	υ Ceti	.	7	1 49 7.393	—0.226	—0.069	—0.139	—0.218	—0.038	6.703	1 54 49.103	42.400	—0.043
	α Arietis	.	7	1 55 16.279	—0.307	—0.077	+0.011	—0.220	—0.026	15.660	2 0 57.995	42.335	+0.022
	θ Arietis	W.	7	2 6 18.337	—0.300	—0.048	—0.002	—0.215	—0.004	17.768	2 12 0.080	+0 5 42.312	+0.045
	ν Arietis	E.	7	2 26 51.209	+0.304	—0.048	+0.002	+0.175	+0.037	51.679	2 32 33.924	+0 5 42.245	+0.112
	Br. 366 . . .	.	7	2 29 39.643	+0.498	—0.095	+0.155	+0.423	+0.042	40.666	2 35 22.920	[42.254]	.
	γ Ceti	.	7	2 31 52.966	+0.269	—0.059	+0.024	+0.163	+0.047	53.362	2 37 35.804	42.442	—0.085
	41 Arietis . . .		7	2 37 47.586	+0.315	—0.092	+0.011	+0.183	+0.059	48.062	2 43 30.287	42.225	+0.132
	σ Arietis . . .		7	2 39 42.237	+0.291	—0.090	—0.008	+0.168	+0.062	42.660	2 45 24.917	42.257	+0.100
	δ Arietis		7	2 59 37.341	+0.300	—0.164	—0.001	+0.173	+0.090	37.739	3 5 20.114	42.375	—0.018
	ζ Arietis		7	3 2 51.719	+0.302	—0.174	+0.001	+0.174	+0.108	52.129	3 8 34.517	42.388	—0.031
	ξ Tauri . . .	.	7	3 15 29.470	+0.280	—0.191	—0.015	+0.165	+0.133	29.842	3 21 12.307	42.465	—0.108
	ε Eridani	.	7	3 22 2.080	+0.249	—0.182	—0.041	+0.165	+0.146	2.417	3 27 44.864	42.447	—0.090
	Gr. 716 . . .	E.	7	3 26 54.021	+0.455	—0.350	+0.121	+0.357	+0.156	54.760	3 32 37.408	+0 5 [42.648]	. . .

NORMAL EQUATIONS.

Assuming

$$a' = -0^s.188 + da' \text{ circle W.} \qquad a'' = -0.104 + da'' \text{ " E.} \qquad c = +0.169 + dc \text{ " E.} \qquad \Delta T = +0^h 5^m 42^s.341 + dt$$

$$\left\{\begin{array}{l} 0 = -0.002 + 2.727\,da' + 1.942\,dc - 0.146\,dt \\ -0.027 + 2.113\,da'' - 1.484\,dc - 0.080\,dt \\ -0.299 + 1.942\,da' - 1.484\,da'' + 26.067\,dc - 1.026\,dt \\ -0.396 - 0.146\,da' - 0.080\,da'' - 1.026\,dc + 18.023\,dt \end{array}\right\} \text{ whence } \begin{array}{l} da' = -0^s.007 \\ da'' = +0.023 \\ dc = +0.014 \\ dt = +0.023 \end{array}$$

$a' = -0^s.195$ (circle west); $a'' = -0^s.081$ (circle east); $c = 0^s.183$ (+ with circle east).

Chronometer No. 1254, at $2^h 7^m.2$ chron. time, $0^h 5^m 42^s.357 \pm 0^s.012$ slow, losing $0^s.119$ per hour.

Transits of stars observed at Santiago de Cuba, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Nov. 30	ε Piscium . .	E.	7	0 51 27.801	+0.278	−0.044	+0.043	+0.360	−0.140	28.298	0 57 13.420	+0 5 45.122	+0.041
	τ Piscium .		7	0 59 49.929	+0.321	−0.019	−0.037	+0.410	−0.124	50.480	1 5 35.625	45.145	+0.018
	f Piscium . . .		7	1 6 21.307	+0.271	−0.005	+0.057	+0.357	−0.110	21.877	1 12 6.905	45.028	+0.135
	ψ Cassiop.		7	1 12 24.436	+0.500	0.000	−0.376	+0.935	−0.098	25.397	1 18 10.529	[45.132]	. . .
	η Piscium . .		7	1 19 49.670	+0.291	−0.009	+0.018	+0.369	−0.083	50.256	1 25 35.325	45.069	+0.094
	43 Cassiop. . . .		7	1 28 26.386	+0.499	−0.056	−0.374	+0.932	−0.066	27.321	1 34 12.504	[45.183]	. .
	o Piscium . . .		7	1 33 48.836	+0.280	−0.041	+0.036	+0.361	−0.055	49.417	1 39 34.648	45.231	−0.068
	γ Arietis		7	1 41 43.450	+0.299	−0.053	+0.004	+0.377	−0.039	44.038	1 47 29.221	45.183	−0.020
	50 Cassiop. . .		7	1 48 17.821	+0.562	−0.113	−0.493	+1.148	−0.026	18.899	1 54 4.006	[45.107]	. . .
	α Arietis		7	1 55 12.124	+0.307	−0.066	−0.011	+0.388	−0.012	12.730	2 0 57.993	45.263	−0.100
	ξ¹ Ceti . . .	E.	7	2 1 23.967	+0.280	−0.063	+0.040	+0.361	0.000	24.585	2 7 9.840	+0 5 45.255	−0.092
	36 H. Cassiop. . . .	W.	7	2 21 53.064	−0.570	+0.183	−0.240	−1.308	+0.042	51.171	2 27 36.508	+0 5[45.337]	.
	ν Arietis . . .		7	2 26 49.420	−0.304	+0.097	−0.003	−0.427	+0.052	48.835	2 32 33.925	45.090	+0.073
	Br. 366		7	2 29 39.493	−0.498	+0.162	−0.176	−1.031	+0.057	38.007	2 35 22.901	[44.894]	. .
	35 Arietis	.	7	2 31 15.026	−0.316	+0.102	−0.013	−0.447	+0.061	14.413	2 36 59.551	45.138	+0.025
	μ Ceti		7	2 33 14.750	−0.282	+0.093	+0.017	−0.402	+0.065	14.241	2 38 59.429	45.188	−0.025
	41 Arietis	.	7	2 37 45.729	−0.315	+0.106	−0.012	−0.445	+0.074	45.137	2 43 30.289	45.152	+0.011
	σ Arietis . . .	.	7	2 39 40.176	−0.291	+0.099	+0.009	−0.410	+0.078	39.661	2 45 24.918	45.257	−0.094
	47 Cephei, H. . . .		7	2 45 49.464	−0.763	+0.270	−0.413	−2.077	+0.090	46.571	2 51 31.926	[45.355]	−0.192
	48 Cephei, H. . . .		7	3 0 42.493	−0.696	+0.283	−0.353	−1.810	+0.120	40.037	3 6 25.235	[45.198]	. .
	ζ Arietis	W.	7	3 2 49.839	−0.302	+0.126	−0.001	−0.424	+0.124	49.362	3 8 34.520	+0 5 45.158	+0.005

NORMAL EQUATIONS.

Assuming
$a' = +0^s.184 + da'$ circle E.
$a'' = +0.138 + da''$ " W.
$c = +0.382 + dc$ " E.
$\triangle T = +0^h 5^m 45^s.173 + dt$

$$\left\{\begin{array}{l} 0 = -0.060 + 3.273\,da' \qquad\qquad - 3.249\,dc - 0.653\,dt \\ \quad + 0.240 \qquad\qquad + 4.956\,da'' + 7.089\,dc - 1.640\,dt \\ \quad + 0.517 - 3.249\,da' + 7.089\,da'' + 28.390\,dc + 1.801\,dt \\ \quad + 0.132 - 0.653\,da' - 1.640\,da'' + 1.801\,dc + 15.276\,dt \end{array}\right\}$$

whence
$da' = +0^s.011$
$da'' = -0.046$
$dc = -0.005$
$dt = -0.013$

$a' = +0^s.195$ (circle east); $a'' = +0^s.092$ (circle west); $c = 0^s.377$ (+ with circle east).

Chronometer No. 1254, at $2^h\ 1^m.1$ chron. time, $0^h\ 5^m\ 45^s.163 \pm 0^s.013$ slow, losing $0^s.121$ per hour.

Transits of stars observed at Santiago de Cuba, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 1	η Piscium	W.	7	1 19 47.986	—0.291	—0.084	+0.003	—0.348	—0.106	47.160	1 25 35.319	+0 5 48.159	+0.018
	40 Cassiop.	.	7	1 23 58.760	—0.572	—0.131	—0.084	—1.119	—0.097	56.757	1 29 45.024	[48.267]	. . .
	π Piscium	.	7	1 25 28.013	—0.286	—0.059	+0.005	—0.344	—0.094	27.235	1 31 15.519	48.284	—0.107
	43 Cassiop.	.	7	1 28 25.910	—0.499	—0.088	—0.061	—0.880	—0.088	24.294	1 34 12.479	[48.185]	.
	ο Piscium	.	7	1 33 47.079	—0.280	—0.037	+0.006	—0.341	—0.076	46.351	1 39 34.644	48.293	—0.116
	ε Cassiop.		7	1 40 42.550	—0.457	—0.044	—0.048	—0.746	—0.062	41.193	1 46 29.444	[48.251]	. .
	β Arietis		7	1 42 46.034	—0.302	—0.025	0.000	—0.359	—0.058	45.290	1 48 33.384	48.094	+0.083
	υ Ceti	.	7	1 49 1.473	—0.227	—0.014	+0.023	—0.363	—0.045	0.847	1 54 49.091	48.244	—0.067
	α Arietis	.	7	1 55 10.654	—0.307	—0.014	—0.002	—0.366	—0.032	9.933	2 0 57.990	48.057	+0.120
	ξ¹ Ceti	W.	7	2 1 22.399	—0.280	—0.009	+0.007	—0.341	—0.020	21.756	2 7 9.838	+0 5 48.082	+0.095
	ι Cassiop.	E.	7	2 14 11.740	+0.493	—0.158	—0.119	+0.757	+0.007	12.720	2 20 0.895	+0 5[48.175]	. . .
	ξ² Ceti		7	2 16 29.686	+0.279	—0.099	+0.014	+0.300	+0.012	30.192	2 22 18.345	48.153	+0.024
	36 H. Cassiop.	.	7	2 21 47.060	+0.570	—0.242	—0.167	+0.979	+0.023	48.223	2 27 36.490	[48.267]	. . .
	ν Arietis	.	7	2 26 45.296	+0.304	—0.147	—0.002	+0.319	+0.033	45.803	2 32 33.925	48.122	+0.055
	Br. 366		7	2 29 33.880	+0.498	—0.257	—0.122	+0.771	+0.039	34.809	2 35 22.883	[48.074]	. . .
	σ Arietis	.	7	2 39 36.254	+0.291	—0.169	+0.006	+0.307	+0.059	36.748	2 45 24.919	48.171	+0.006
	η Eridani	.	7	2 45 14.387	+0.250	—0.152	+0.032	+0.301	+0.071	14.889	2 51 3.102	48.213	—0.036
	ε Arietis	.	7	2 47 6.256	+0.303	—0.186	—0.001	+0.318	+0.075	6.775	2 52 55.105	48.330	—0.153
	δ Arietis	.	7	2 59 31.529	+0.300	—0.191	+0.001	+0.315	+0.101	32.055	3 5 20.121	48.066	+0.111
	ζ Arietis	E.	7	3 2 45.779	+0.302	—0.194	—0.001	+0.317	+0.107	46.310	3 8 35.523	+0 5 48.213	—0.036

NORMAL EQUATIONS.

Assuming
$$\begin{array}{ll} a' = +0^s.038 + da' & \text{circle W.} \\ a'' = +0.100 + da'' & \text{" E.} \\ c = +0.324 + dc & \text{" E.} \\ \triangle T = +0^h\,5^m\,48^s.169 + dt. & \end{array} \left\{ \begin{array}{l} 0 = +0.049 + 3.495\,da' \qquad\qquad + 2.537\,dc + 0.157\,dt \\ \quad +0.083 \qquad\qquad + 3.315\,da'' - 4.240\,dc + 0.668\,dt \\ \quad +0.131 + 2.531\,da' - 4.240\,da'' + 25.857\,dc + 0.041\,dt \\ \quad -0.196 - 0.157\,da' - 0.668\,da'' - 0.041\,dc + 15.455\,dt \end{array} \right\} \text{whence} \begin{array}{l} da' = -0^s.006 \\ da'' = -0.036 \\ dc = -0.007 \\ dt = +0.009 \end{array}$$

$a' = +0^s.032$ (circle west); $a'' = +0^s.064$ (circle east); $c = 0^s.317$ (+ with circle east).

Chronometer No. 1254, at $2^h\,10^m.9$ chron. time, $0^h\,5^m\,48^s.177 \pm 0^s.016$ slow, losing $0^s.124$ per hour.

Transits of stars observed at Santiago de Cuba, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v.*
1889.				*h. m. s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
Dec. 2	β Ceti	E.	7	0 32 11.747	+0.233	−0.041	+0.241	+0.333	−0.227	12.286	0 38 3.401	+0 5 51.115	+0.030
	ζ Andromedæ . . .		7	0 35 38.361	+0.308	−0.062	−0.026	+0.345	−0.220	38.706	0 41 29.788	51.082	+0.063
	Br. 82	.	7	0 38 11.980	+0.461	−0.098	−0.570	+0.712	−0.216	12.269	0 44 3.172	[50.903]	. . .
	γ Cassiop.	.	7	0 44 12.610	+0.434	−0.098	−0.475	+0.635	−0.204	12.902	0 50 4.179	[51.277]	. . .
	ε Piscium . .		7	0 51 21.834	+0.277	−0.066	+0.081	+0.319	−0.190	22.255	0 57 13.406	51.151	−0.006
	44 Cephei, H. . .	.	7	0 56 57.600	+0.768	−0.182	−1.663	+1.668	−0.178	58.013	1 2 49.306	[51.293]	. . .
	τ Piscium . .		7	0 59 44.074	+0.321	−0.075	−0.070	+0.362	−0.173	44.440	1 5 35.601	51.161	−0.016
	υ Piscium		7	1 7 33.141	+0.315	−0.063	−0.048	+0.354	−0.158	33.541	1 13 24.693	51.152	−0.007
	η Piscium . . .	E.	7	1 19 43.603	+0.291	−0.046	+0.034	+0.327	−0.134	44.075	1 25 35.313	+0 5 51.238	−0.093
	ο Tauri . . .	W.	7	3 13 2.846	−0.281	−0.014	+0.020	−0.360	+0.089	2.300	3 18 53.468	+0 5 51.168	−0.023
	ξ Tauri		7	3 15 21.671	−0.282	−0.010	+0.019	−0.361	+0.093	21.130	3 21 12.304	51.174	−0.029
	f Tauri		7	3 18 57.197	−0.287	−0.003	+0.014	−0.365	+0.101	56.657	3 24 47.812	51.155	−0.010
	ε Eridani .		7	3 21 54.137	−0.249	+0.002	+0.052	−0.361	+0.106	53.687	3 27 44.874	51.187	−0.042
	Gr. 716 . . .	.	7	3 26 47.720	−0.455	+0.013	−0.154	−0.780	+0.116	46.460	3 32 37.399	[50.939]	. . .
	γ Camelop. . .		7	3 32 56.700	−0.447	+0.025	−0.246	−1.093	+0.127	55.066	3 38 46.444	[51.378]	. . .
	η Tauri . . .	.	7	3 35 6.007	−0.308	+0.017	−0.007	−0.389	+0.132	5.452	3 40 56.578	51.126	+0.019
	27 Tauri		7	3 36 46.627	−0.308	+0.020	−0.007	−0.389	+0.135	46.078	3 42 37.133	51.055	+0.090
	9 H. Camelop. .	.	7	3 41 56.000	−0.439	+0.032	−0.138	−0.729	+0.146	54.872	3 47 46.105	[51.233]	. . .
	λ Tauri	.	7	3 48 44.329	−0.287	+0.026	+0.014	−0.364	+0.159	43.877	3 54 35.037	51.160	−0.015
	A¹ Tauri	W.	7	3 52 20.806	−0.304	+0.029	−0.003	−0.383	+0.166	20.311	3 58 11.416	+0 5 51.105	+0.040

NORMAL EQUATIONS.

Assuming
$$\begin{aligned} a' &= +0^s.346 + da' \quad \text{circle E.} \\ a'' &= +0.133 + da'' \quad \text{" W.} \\ c &= +0.348 + dc \quad \text{" E.} \\ \triangle T &= +0^h 5^m 51^s.144 + dt. \end{aligned}
\quad
\left\{\begin{aligned} 0 = &-0.112 + 3.457\,da' - 3.288\,dc - 0.762\,dt \\ &+0.120 + 2.922\,da'' + 2.596\,dc - 0.498\,dt \\ &+0.462 - 3.288\,da' + 2.596\,da'' + 25.993\,dc - 2.108\,dt \\ &-0.029 - 0.762\,da' - 0.498\,da'' - 2.108\,dc + 15.719\,dt \end{aligned}\right\}
\quad \text{whence}
\begin{aligned} da' &= +0^s.021 \\ da'' &= -0.030 \\ dc &= -0.012 \\ dt &= +0.0003 \end{aligned}$$

$a' = +0^s.367$ (circle east); $a'' = +0^s.103$ (circle west); $c = 0^s.336$ (+ with circle east).

Chronometer No. 1254, at $2^h\ 27^m.8$ chron. time, $0^h\ 5^m\ 51^s.145 \pm 0^s.008$ slow, losing $0^s.118$ per hour.

Transits of stars observed at Santiago de Cuba, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 3	12 Ceti	W.	7	0 18 31.737	—0.258	0.000	—0.025	—0.414	—0.119	30.921	0 24 24.679	+0 5 53.758	— 0.066
	κ Cassiop. . .	.	7	0 20 52.380	—0.450	0.000	+0.086	—0.889	—0.114	51.013	0 26 44.824	[53.811]	.
	π Andromedæ .	.	7	0 25 6.923	—0.329	0.000	+0.016	—0.493	—0.107	6.010	0 30 59.662	53.652	+ 0.040
	ε Andromedæ .	.	7	0 26 51.081	—0.319	0.000	+0.010	—0.470	—0.104	50.198	0 32 43.862	53.664	+ 0.028
	21 Cassiop. . . .	.	7	0 32 32.360	—0.612	0.000	+0.178	—1.535	—0.093	30.298	0 38 23.989	[53.691]	. .
	ζ Andromedæ	.	7	0 35 36.933	—0.308	0.000	+0.004	—0.451	—0.087	36.091	0 41 29.778	53.687	+ 0.005
	δ Piscium . . .	.	6	0 37 4.726	—0.277	0.000	—0.013	—0.416	—0.085	3.935	0 42 57.770	53.835	— 0.143
	γ Cassiop. . .	.	7	0 44 11.720	—0.434	0.000	+0.076	—0.829	—0.072	10.461	0 50 4.155	[53.694]	
	τ Piscium . . .		7	0 59 42.741	—0.320	0.000	+0.010	—0.475	—0.043	41.913	1 5 35.590	53.677	+ 0.015
	υ Piscium . . .	W.	7	1 7 31.946	—0.315	0.000	+0.008	—0.462	—0.029	31.148	1 13 24.684	+0 5 53.536	+ 0.156
	40 Cassiop. . .	E.	7	1 23 49.710	+0.572	0.000	—0.342	+1.239	+0.001	51.180	1 29 44.950	+0 5 [53.770]	. . .
	43 Cassiop. . . .	.	7	1 28 17.490	+0.499	0.000	—0.250	+0.974	+0.009	18.722	1 34 12.427	[53.705]	. . .
	ο Piscium . . .	.	7	1 33 40.304	+0.280	0.000	+0.024	+0.377	+0.019	41.004	1 39 34.635	53.631	+ 0.061
	γ Arietis . . .	.	7	1 41 34.797	+0.299	0.000	+0.003	+0.394	+0.033	35.526	1 47 29.199	53.673	+ 0.019
	β Arietis . . .		7	1 42 38.894	+0.302	0.000	—0.001	+0.398	+0.035	39.628	1 48 33.375	53.747	— 0.055
	50 Cassiop. . . .	.	7	1 48 8.940	+0.562	0.000	—0.329	+1.200	+0.045	10.418	1 54 3.920	[53.502]	.
	α Arietis	.	7	1 55 3.546	+0.307	0.000	—0.007	+0.405	+0.058	4.309	2 0 57.984	53.675	+ 0.017
	ξ¹ Ceti	.	7	2 1 15.356	+0.280	0.000	+0.027	+0.377	+0.070	16.110	2 7 9.833	53.723	— 0.031
	γ Trianguli. . .		7	2 4 51.640	+0.330	0.000	—0.036	+0.446	+0.076	52.456	2 10 46.234	53.778	— 0.086
	θ Arietis. . . .	E.	7	2 6 5.620	+0.300	0.000	+0.001	+0.395	+0.078	6.394	2 12 0.052	+0 5 53.658	+ 0.034

NORMAL EQUATIONS.

Assuming

$$\begin{array}{lll} a' = -0.058 + da' & \text{circle W.} \\ a'' = +0.087 + da'' & \text{" E.} \\ c = +0.418 + dc & \text{" E.} \\ \Delta T = +0^h\,5^m\,53^s.672 + dt. & \end{array} \quad \left\{\begin{array}{l} 0 = +0.142 + 3.034\,da' + 3.975\,dc - 1.630\,dt \\ \quad -0.223 + 3.375\,da'' - 4.132\,dc - 1.286\,dt \\ \quad +0.885 + 3.975\,da' - 4.132\,da'' + 27.048\,dc - 0.502\,dt \\ \quad -0.300 - 1.630\,da' - 1.286\,da'' - 0.502\,dc + 15.487\,dt \end{array}\right\} \quad \text{whence} \begin{array}{l} da' = -0.001 \\ da'' = +0.043 \\ dc = -0.025 \\ dt = +0.022 \end{array}$$

$a' = -0^s.059$ (circle west); $a'' = +0^s.130$ (circle east); $c = 0^s.393$ (+ with circle east).

Chronometer No. 1254, at $1^h\,23^m.3$ chron. time, $0^h\,5^m\,53^s.692 \pm 0^s.013$ slow, losing $0^s.110$ per hour.

Transits of stars observed at Port Plata, San Domingo, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 14	o Tauri	E.	7	2 51 57.940	+0.281	+0.090	+0.076	+0.575	−0.072	58.890	3 18 53.491	+0 26 54.601	+ 0.022
	f Tauri		6	2 57 52.175	+0.287	+0.105	+0.050	+0.583	−0.064	53.136	3 24 47.840	54.704	− 0.081
	o Persei		7	3 10 29.566	+0.326	+0.145	−0.096	+0.670	−0.044	30.567	3 37 25.146	54.579	+ 0.044
	η Tauri		7	3 14 1.134	+0.308	+0.145	−0.029	+0.622	−0.039	2.141	3 40 56.630	54.489	+ 0.134
	27 Tauri		7	3 15 41.553	+0.308	+0.148	−0.029	+0.622	−0.036	42.566	3 42 37.179	54.613	+ 0.010
	9 H. Camelop.		7	3 20 50.093	+0.438	+0.227	−0.521	+1.166	−0.028	51.375	3 47 46.144	[54.769]	. .
	λ Tauri		7	3 27 39.326	+0.315	+0.165	+0.053	+0.582	−0.017	40.424	3 54 35.096	54.672	− 0.049
	Gr. 750	E.	7	3 35 22.720	+1.425	+0.916	−4.276	+6.895	−0.005	27.675	4 2 22.043	+0 26[54.368]	. .
	δ Tauri	W.	7	3 49 41.563	−0.296	+0.142	+0.004	−0.641	+0.017	40.789	4 16 35.431	+0 26 54.642	− 0.019
	ε Tauri		7	3 55 17.681	−0.299	+0.155	+0.002	−0.644	+0.026	16.921	4 22 11.590	54.669	− 0.046
	α Tauri		7	4 2 42.691	−0.294	+0.168	+0.006	−0.635	+0.036	41.972	4 29 36.530	54.558	+ 0.065
	ν Eridani		7	4 3 55.584	−0.260	+0.150	+0.038	−0.610	+0.039	54.941	4 30 49.431	54.490	+ 0.133
	Gr. 848		7	4 7 12.940	−0.644	+0.382	−0.323	−2.473	+0.044	9.926	4 34 4.691	[54.765]	. .
	α Camelop.		7	4 16 15.290	−0.483	+0.311	−0.172	−1.507	+0.059	13.498	4 43 7.810	[54.312]	. . .
	i Tauri		7	4 18 2.386	−0.299	+0.194	+0.002	−0.642	+0.061	1.702	4 44 56.370	54.668	− 0.045
	ι Aurigæ	W.	7	4 22 55.877	−0.329	+0.218	−0.026	−0.726	+0.069	55.083	4 49 49.880	+0 26 54.797	− 0.174

NORMAL EQUATIONS.

$$\text{Assuming}\quad \begin{array}{ll} a' = +0.339 + da' & \text{circle E.} \\ a'' = +0.104 + da'' & \text{" W.} \\ c = +0.552 + dc & \text{" E.} \\ \triangle T = +0^h 26^m 54^s.629 + dt & \end{array} \left\{ \begin{array}{l} 0 = -0.020 + 2.540\,da' \qquad\qquad - 2.915\,dc - 0.606\,dt \\ \quad -0.082 \qquad\qquad + 2.437\,da'' + 2.583\,dc - 0.616\,dt \\ \quad -0.622 - 2.915\,da' + 2.583\,da'' + 21.029\,dc - 0.183\,dt \\ \quad +0.120 - 0.606\,da' - 0.616\,da'' - 0.183\,dc + 12.795\,dt \end{array} \right\} \text{whence} \begin{array}{l} da' = +0.049 \\ da'' = -0.008 \\ dc = +0.037 \\ dt = -0.007 \end{array}$$

$a' = +0^s.388$ (circle east); $a'' = +0^s.096$ (circle west); $c = 0^s.589$ (+ with circle east).

Chronometer No. 1254, at $3^h\,38^m.8$ chron. time, $0^h\,26^m\,54^s.623 \pm 0^s.017$ slow, losing $0^s.094$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 15	φ Pegasi	W.	7	23 19 56.693	−0.298	+0.038	+0.005	−0.568	−0.058	55.812	23 46 52.360	+0 26 56.548	− 0.032
	ω Piscium		7	23 26 42.974	−0.277	+0.081	+0.051	−0.541	−0.048	42.240	23 53 38.670	56.430	+ 0.087
	α Andromedæ		7	23 35 45.391	−0.318	+0.149	−0.037	−0.612	−0.035	44.538	0 2 41.106	56.568	− 0.052
	γ Pegasi		7	23 40 37.424	−0.291	+0.154	+0.020	−0.556	−0.027	36.724	0 7 33.269	56.545	− 0.029
	Br. 6		7	23 43 6.110	−0.660	+0.362	−0.755	−2.277	−0.024	2.756	0 9 59.174	[56.418]	. . .
	κ Cassiop.		7	23 59 49.660	−0.449	+0.252	−0.311	−1.158	+0.001	47.995	0 26 44.445	[56.450]	. . .
	π Andromedæ		7	0 4 3.833	−0.329	+0.179	−0.059	−0.642	+0.008	2.990	0 30 59.505	56.515	+ 0.001
	ε Andromedæ		7	0 5 48.013	−0.319	+0.171	−0.038	−0.613	+0.010	47.224	0 32 43.720	56.496	+ 0.020
	α Cassiop.	W.	7	0 7 20.160	−0.408	+0.216	−0.225	−0.960	+0.012	18.795	0 34 15.414	+0 26[56.619]	. . .
	ε Piscium	E.	7	0 30 15.900	+0.278	−0.063	+0.117	+0.502	+0.047	16.781	0 57 13.290	+0 26 56.509	+ 0.007
	44 H. Cephei	E.	7	0 35 50.880	+0.764	−0.173	−2.414	+2.629	+0.055	51.741	1 2 48.252	+0 26[56.511]	. .

NORMAL EQUATIONS.

$$\text{Assuming}\quad \begin{array}{ll} a' = +0.153 + da' & \text{circle W.} \\ a'' = +0.534 + da'' & \text{" E.} \\ c = +0.522 + dc & \text{" E.} \\ \triangle T = +0^h 26^m 56^s.501 + dt. & \end{array} \left\{ \begin{array}{l} 0 = -0.128 + 2.785\,da' \qquad\qquad + 3.935\,dc - 1.653\,dt \\ \quad 0.000 \qquad\qquad + 1.490\,da'' - 1.456\,dc - 0.098\,dt \\ \quad -0.064 + 3.935\,da' - 1.456\,da'' + 15.219\,dc - 7.243\,dt \\ \quad -0.062 - 1.653\,da' - 0.098\,da'' - 7.243\,dc + 8.005\,dt \end{array} \right\} \text{whence} \begin{array}{l} da' = +0.061 \\ da'' = -0.002 \\ dc = -0.004 \\ dt = +0.017 \end{array}$$

$a' = +0^s.214$ (circle west); $a'' = +0^s.532$ (circle east); $c = 0^s.518$ (+ with circle east).

Chronometer No. 1254, at $23^h\,58^m.9$ chron. time, $0^h\,26^m\,56^s.516 \pm 0^s.012$ slow, losing $0^s.089$ per hour.

Transits of stars observed at Port Plata, San Domingo, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1889.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Dec. 16	ω² Aquarii . . .	E.	7	23 10 0.524	+0.240	−0.054	+0.207	+0.479	−0.077	1.319	23 36 59.808	+0 26 58.489	+0.083
	41 H. Cephei . .	.	7	23 15 38.750	+0.494	−0.146	−0.660	+1.191	−0.069	39.560	23 42 38.130	[58.570]	.
	φ Pegasi . . .	.	7	23 19 53.154	+0.298	−0.102	+0.008	+0.487	−0.063	53.782	23 46 52.348	58.566	+0.006
	ω Piscium . . .	.	7	23 26 39.419	+0.277	−0.115	+0.082	+0.465	−0.053	40.075	23 53 38.659	58.584	−0.012
	α Andromedæ .	.	7	23 35 41.941	+0.318	−0.161	−0.060	+0.526	−0.040	42.524	0 2 41.092	58.568	+0.004
	γ Pegasi . . .		7	23 40 34.059	+0.291	−0.157	+0.033	+0.477	−0.033	34.670	0 7 33.258	58.588	−0.016
	Br. 6	.	7	23 42 59.800	+0.660	−0.369	−1.228	+1.956	−0.030	0.789	0 8 59.989	[58.300]	
	κ Cassiop. . . .	.	7	23 59 45.090	+0.449	−0.286	−0.506	+0.995	−0.005	45.737	0 26 44.409	[58.672]	. .
	ε Andromedæ .	E.	7	0 5 44.474	+0.319	−0.210	−0.061	+0.527	+0.003	45.052	0 32 43.705	+0 26 58.653	−0.081
	ζ Andromedæ .	W.	7	0 14 31.856	−0.308	+0.153	−0.006	−0.548	+0.016	31.163	0 41 29.628	+0 26 58.465	+0.107
	δ Piscium . . .	.	7	0 15 59.647	−0.277	+0.143	+0.017	−0.505	+0.018	59.043	0 42 57.648	58.605	−0.033
	γ Cassiop. . .	.	7	0 23 6.610	−0.433	+0.237	−0.099	−1.008	+0.028	5.335	0 50 3.797	[58.462]	. .
	ε Piscium . . .	.	7	0 30 15.263	−0.278	+0.165	+0.017	−0.506	+0.039	14.700	0 57 13.281	58.581	−0.009
	44 H. Cephei . .	.	7	0 35 52.610	−0.764	+0.478	−0.345	−2.651	+0.047	49.375	1 2 48.157	[58.782]	. .
	τ Piscium . . .	.	7	0 38 37.477	−0.321	+0.208	−0.015	−0.577	+0.051	36.823	1 5 35.459	58.636	−0.064
	f Piscium . .		7	0 45 8.727	−0.271	+0.189	+0.022	−0.503	+0.060	8.224	1 12 6.788	58.564	+0.008
	υ Piscium . . .	W.	7	0 46 26.594	−0.314	+0.222	−0.010	−0.562	+0.062	25.992	1 13 24.558	−0 26 58.566	+0.006

NORMAL EQUATIONS.

$$
\begin{aligned}
&\text{Assuming } a' = +0.494 + da' \text{ circle E.} \\
&a'' = +0.045 + da'' \text{ " W.} \\
&c = +0.491 + dc \text{ " E.} \\
&\triangle T = +0^{h}\,26^{m}\,58^{s}.581 + dt.
\end{aligned}
\qquad
\left\{
\begin{aligned}
0 &= +0.480 + 3.477\,da' - 3.379\,dc + 0.282\,dt \\
&\quad -0.053 + 2.355\,da'' + 2.432\,dc - 0.503\,dt \\
&\quad -0.369 - 3.379\,da' + 2.432\,da'' + 22.468\,dc + 0.745\,dt \\
&\quad +0.053 + 0.282\,da' - 0.503\,da'' + 0.745\,dc + 13.189\,dt
\end{aligned}
\right\}
\text{ whence }
\begin{aligned}
da' &= -0.015 \\
da'' &= +0.031 \\
dc &= -0.009 \\
dt &= +0.001
\end{aligned}
$$

$a' = +0^{s}.348$ (circle east); $a'' = +0^{s}.076$ (circle west); $c = 0^{s}.482$ (+ with circle east).

Chronometer No. 1254, at $0^{h}\,3^{m}.4$ chron. time, $0^{h}\,26^{m}\,58^{s}.572 \pm 0^{s}.010$ slow, losing $0^{s}.087$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Dec. 19	ω Piscium . . .	E.	7	23 26 33.246	+0.277	+0.035	−0.232	+0.550	−0.080	33.796	23 53 38.626	+0 27 4.830	+0.105
	38 Piscium . . .	.	7	23 32 35.916	+0.255	+0.040	−0.435	+0.550	−0.071	36.255	23 59 41.176	4.921	+0.014
	α Andromedæ .		7	23 35 34.994	+0.318	+0.054	+0.168	+0.622	−0.067	36.089	0 2 41.050	4.961	0.026
	Br. 6	.	7	23 42 47.540	+0.660	+0.133	+3.470	+2.315	−0.057	54.061	0 9 58.867	[4.806]	. .
	σ Andromedæ	.	7	23 45 27.633	+0.336	+0.071	+0.343	+0.678	−0.053	29.008	0 12 33.924	4.916	+0.019
	κ Cassiop. . . .		7	23 59 36.190	+0.449	+0.116	+1.429	+1.178	−0.033	39.329	0 26 44.298	[4.969]	.
	π Andromedæ .	.	7	0 3 53.234	+0.329	+0.089	+0.269	+0.653	−0.027	54.547	0 30 59.446	4.899	+0.036
	ε Andromedæ		7	0 5 37.434	+0.318	+0.088	+0.173	+0.624	−0.024	38.613	0 32 43.662	5.049	−0.114
	21 Cassiop. . .		7	0 11 12.290	+0.610	+0.172	+2.974	+2.031	−0.016	18.061	0 38 22.964	[4.903]	. . .
	ζ Andromedæ .	E.	7	0 14 23.540	+0.308	+0.089	+0.072	+0.597	−0.012	24.594	0 41 29.594	+0 27 5.000	−0.065
	ε Piscium . .	W.	7	0 30 9.579	−0.278	−0.035	−0.226	−0.592	+0.011	8.459	0 57 13.251	+0 27 4.792	+0.143
	τ Piscium . . .		7	0 38 31.231	−0.321	−0.076	+0.200	−0.674	+0.023	30.383	1 5 35.418	5.035	−0.100
	f Piscium . . .	.	7	0 45 3.040	−0.271	−0.079	−0.299	−0.588	+0.032	1.835	1 12 6.754	4.919	+0.016
	υ Piscium . . .		7	0 46 20.527	−0.314	−0.092	+0.139	−0.657	+0.034	19.637	1 13 24.523	4.886	+0.049
	ψ Cassiop. . . .		7	0 51 4.971	−0.498	−0.151	+2.004	−1.537	+0.041	4.830	1 18 9.868	[5.038]	. .
	38 Cassiop. . . .		6	0 55 58.248	−0.525	−0.154	+2.278	−1.691	+0.048	58.204	1 23 2.936	[4.732]	
	η Piscium . . .	.	7	0 58 31.229	−0.291	−0.082	−0.094	−0.607	+0.051	30.206	1 25 35.181	4.975	−0.040
	π Piscium . . .	.	7	1 4 11.473	−0.286	−0.065	−0.151	−0.599	+0.059	10.431	1 31 15.386	4.955	−0.020
	φ Persei	.	7	1 9 41.067	−0.381	−0.077	+0.814	−0.916	+0.067	40.574	1 36 45.597	[5.023]	. . .
	τ Ceti	.	7	1 11 53.401	−0.243	−0.033	−0.639	−0.612	+0.071	51.945	1 38 56.950	5.005	−0.070
	β Arietis . . .	W.	7	1 21 29.224	−0.302	0.000	+0.008	−0.626	+0.084	28.388	1 48 33.267	+0 27 4.879	+0.056

NORMAL EQUATIONS.

$$
\begin{aligned}
&\text{Assuming } a' = -0.963 + da' \text{ circle E.} \\
&a'' = -1.054 + da'' \text{ " W.} \\
&c = +0.579 + dc \text{ " E.} \\
&\triangle T = +0^{h}\,27^{m}\,4^{s}.933 + dt
\end{aligned}
\qquad
\left\{
\begin{aligned}
0 &= +0.022 + 3.808\,da' - 4.748\,dc - 1.659\,dt \\
&\quad -0.028 + 2.907\,da'' + 2.288\,dc - 0.374\,dt \\
&\quad +0.211 - 4.748\,da' + 2.288\,da'' + 27.946\,dc - 1.083\,dt \\
&\quad -0.103 - 1.659\,da' - 0.374\,da'' - 1.083\,dc + 16.637\,dt
\end{aligned}
\right\}
\text{ whence }
\begin{aligned}
da' &= -0.020 \\
da'' &= +0.020 \\
dc &= -0.012 \\
dt &= +0.004
\end{aligned}
$$

$a' = -0^{s}.983$ (circle east); $a'' = -1^{s}.034$ (circle west); $c = 0^{s}.567$ (+ with circle east).

Chronometer No. 1254, at $0^{h}\,22^{m}.6$ chron. time, $0^{h}\,27^{m}\,4^{s}.935 \pm 0^{s}.013$ slow, losing $0^{s}.086$ per hour.

Transits of stars observed at Port Plata, San Domingo, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
1889. Dec. 20	β Ceti	E.	6	0 10 56.359	+0.233	0.000	−0.686	+0.491	−0.207	56.190	0 38 3.206	+0 27 7.016	+ 0.128
	44 H. Cephei .		6	0 35 32.606	+0.764	−0.046	+4.747	+2.455	−0.172	40.354	1 2 47.768	[7.414]	. . .
	υ Piscium . . .	.	7	0 46 16.703	+0.314	−0.028	+0.140	+0.520	−0.157	17.492	1 13 24.511	7.019	+ 0.125
	ψ Cassiop. . . .	.	7	0 50 59.140	+0.498	−0.049	+2.037	+1.218	−0.150	2.694	1 18 9.839	[7.145]	. . .
	38 Cassiop. . . .		7	0 55 52.000	+0.525	−0.059	+2.304	+1.340	−0.144	55.966	1 23 2.892	[6.926]	. . .
	η Piscium .		7	0 58 27.510	+0.291	−0.033	−0.095	+0.481	−0.140	28.014	1 25 35.171	7.157	− 0.013
	π Piscium . . .	.	7	1 4 7.761	+0.286	−0.038	−0.153	+0.475	−0.132	8.199	1 31 15.377	7.178	− 0.034
	ν Piscium . .	.	7	1 8 34.333	+0.275	−0.041	−0.270	+0.467	−0.126	34.638	1 35 41.828	7.190	− 0.046
	ο Piscium . . .	E.	7	1 12 26.830	+0.281	−0.045	−0.206	+0.470	−0.120	27.210	1 39 34.517	+0 27 7.307	− 0.163
	β Arietis . . .	W.	7	1 21 27.129	−0.302	−0.053	+0.008	−0.538	−0.108	26.136	1 48 33.258	+0 27 7.122	+ 0.022
	ξ Persei . . .		7	3 24 43.169	−0.334	−0.108	+0.350	−0.620	+0.066	42.523	3 51 49.661	7.138	+ 0.006
	α Tauri		7	4 2 30.219	−0.294	−0.068	−0.068	−0.526	+0.119	29.382	4 29 36.559	7.177	− 0.033
	ν Eridani . .		7	4 3 43.500	−0.260	−0.059	−0.421	−0.506	+0.121	42.375	4 30 49.459	7.084	+ 0.060
	Gr. 848 . . .		7	4 6 56.820	−0.644	−0.145	+3.557	−2.050	+0.125	57.663	4 34 4.700	[7.037]	. . .
	19 H. Camelop.		7	4 37 21.110	−0.770	−0.270	+4.812	−2.671	+0.168	22.379	5 4 29.563	[7.184]	. .
	γ Orionis . . .		7	4 52 7.793	−0.277	−0.127	−0.250	−0.508	+0.189	6.820	5 19 13.980	7.160	− 0.016
	φ¹ Orionis . . .	.	7	5 1 40.854	−0.282	−0.149	−0.194	−0.512	+0.203	39.920	5 28 47.014	7.094	+ 0.050
	ζ Tauri . . .	W.	7	5 3 57.900	−0.303	−0.166	+0.024	−0.541	+0.206	57.120	5 31 4.348	+0 27 7.228	− 0.084

NORMAL EQUATIONS.

Assuming
$$\begin{aligned} a' &= -\overset{s.}{1.119} + da' \text{ circle E.} \\ a'' &= -1.077 + da'' \quad \text{" W.} \\ c &= +0.497 + dc \quad \text{" E.} \\ \triangle T &= +0^h\,27^m\,7^s.166 + dt \end{aligned}
\quad
\left\{\begin{aligned} 0 = &-0.328 + 3.942\,da' \qquad\qquad\qquad - 2.997\,dc - 0.053\,dt \\ &-0.027 \qquad\qquad + 3.045\,da'' + 2.817\,dc - 0.189\,dt \\ &+0.452 - 2.997\,da' + 2.817\,da'' + 23.673\,dc - 0.392\,dt \\ &+0.337 - 0.053\,da' - 0.189\,da'' - 0.392\,dc + 13.722\,dt \end{aligned}\right\}
\text{ whence }
\begin{aligned} da' &= +\overset{s.}{0.073} \\ da'' &= +0.019 \\ dc &= -0.012 \\ dt &= -0.024 \end{aligned}$$

$a' = -1^s.046$ (circle east); $a'' = -1^s.058$ (circle west); $c = 0^s.485$ (+ with circle east).

Chronometer No. 1254, at $2^h\,37^m.9$ chron. time, $0^h\,27^m\,7^s.144 \pm 0^s.015$ slow, losing $0^s.085$ per hour.

Transits of stars observed at Port Plata, San Domingo, by Ensign L. M. Garrett, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
1889. Dec. 28	ο Piscium . . .	E.	7	1 12 9.114	+0.281	−0.126	−0.034	+0.444	−0.074	9.605	1 39 34.443	+0 27 24.838	+0.089
	ϵ Cassiop. . . .		7	1 19 2.360	+0.455	−0.220	+0.261	+0.971	−0.064	3.763	1 46 28.745	[24.982]	. .
	50 Cassiop. . . .		6	1 26 35.981	+0.559	−0.293	+0.436	+1.412	−0.053	38.042	1 54 2.885	[24.843]	. .
	α Arietis . .		7	1 33 32.324	+0.307	−0.176	+0.010	+0.477	−0.043	32.899	2 0 57.800	24.901	+0.026
	ξ¹ Ceti		7	1 39 44.223	+0.280	−0.171	−0.035	+0.444	−0.034	44.707	2 7 9.680	24.973	−0.046
	θ Arietis . .	E.	7	1 44 34.364	+0.300	−0.193	−0.001	+0.465	−0.027	34.908	2 11 59.907	+0 27 24.999	−0.072
	36 H. Cassiop. . .	W.	7	2 0 11.780	−0.577	+0.128	+0.816	−1.579	−0.003	10.565	2 27 35.592	+0 27 [25.027]	. .
	ν Arietis . . .		7	2 5 9.617	−0.304	+0.074	+0.004	−0.515	+0.004	8.880	2 32 33.798	24.918	+0.009
	Br. 366 . .		7	2 7 58.440	−0.496	+0.126	+0.598	−1.244	+0.008	57.432	2 35 22.286	[24.854]	. .
	35 Arietis . . .	.	7	2 9 35.234	−0.315	+0.082	+0.045	−0.539	+0.010	34.517	2 36 59.422	24.905	+0.022
	41 Arietis . . .		7	2 16 6.031	−0.315	+0.091	+0.042	−0.536	+0.020	5.333	2 43 30.180	24.847	+0.080
	ε Arietis .	.	7	2 25 30.696	−0.303	+0.099	+0.006	−0.513	+0.034	30.019	2 52 55.035	25.016	−0.089
	δ Arietis . .	.	7	2 37 55.804	−0.300	+0.113	−0.003	−0.508	+0.052	55.158	3 5 20.065	24.907	+0.020
	ζ Arietis . .	W.	7	7 41 10.166	−0.302	+0.117	+0.005	−0.512	+0.057	9.531	3 8 34.485	+0 27 24.954	−0.027

NORMAL EQUATIONS.

$$
\begin{aligned}
&\text{Assuming } a' = -0^{s}.221 + da' \text{ circle E.} \\
&a'' = -0.271 + da'' \text{ ” W.} \\
&c = +0.460 + dc \text{ ” E.} \\
&\triangle T = +0^{h}\,27^{m}\,24^{s}.929 + dt.
\end{aligned}
\quad
\left\{
\begin{aligned}
0 &= -0.099 + 1.944\,da' \qquad\qquad - 2.165\,dc - 0.595\,dt \\
&+0.087 \qquad + 2.146\,da'' + 3.102\,dc - 1.258\,dt \\
&+0.248 - 2.165\,da' + 3.102\,da'' + 18.420\,dc - 2.290\,dt \\
&+0.006 - 0.595\,da' - 1.258\,da'' - 2.290\,dc + 10.936\,dt
\end{aligned}
\right\}
\quad
\begin{aligned}
\text{whence } da' &= +0^{s}.049 \\
da'' &= -0.041 \\
dc &= -0.001 \\
dt &= -0.003
\end{aligned}
$$

$a' = -0^{s}.172$ (circle east); $a'' = -0^{s}.312$ (circle west); $c = 0^{s}.459$ (+ with circle east).

Chronometer No. 1254, at $2^{h}\,2^{m}.5$ chron. time, $0^{h}\,27^{m}\,24^{s}.927 \pm 0^{s}.013$ slow, losing $0^{s}.088$ per hour.

Transits of stars observed at Port Plata, San Domingo by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
1890. Jan. 2	ε Piscium . . .	W.	7	0 29 38.447	−0.277	−0.044	−0.078	−0.486	−0.074	37.488	0 57 13.093	+0 27 35.605	−0.075
	44 H. Cephei . .		7	0 35 12.500	−0.764	−0.124	+1.625	−2.545	−0.067	10.625	1 2 46.446	[35.821]	. . .
	τ Piscium . . .		7	0 38 0.651	−0.321	−0.053	+0.069	−0.554	−0.064	59.728	1 5 35.230	35.502	+0.028
	f Piscium . .		5	0 44 32.046	−0.271	−0.048	−0.103	−0.482	−0.056	31.086	1 12 6.614	35.528	+0.002
	υ Piscium . . .	.	7	0 45 49.799	−0.314	−0.055	+0.048	−0.539	−0.055	48.884	1 13 24.351	35.467	+0.063
	η Piscium . . .	.	7	0 58 0.413	−0.291	−0.056	−0.033	−0.498	−0.041	59.494	1 25 35.035	35.541	−0.011
	40 Cassiop. . . .		7	1 2 9.421	−0.570	−0.111	+0.945	−1.601	−0.036	8.048	1 29 43.440	[35.392]	. .
	π Piscium . . .	W.	7	1 3 40.617	−0.286	−0.055	−0.052	−0.492	−0.035	39.697	1 31 15.244	+0 27 35.547	−0.017
	50 Cassiop. . . .	E.	4	1 26 25.091	+0.559	−0.251	+0.129	+1.421	−0.008	26.941	1 54 2.620	+0 27 [35.679]	. . .
	ξ¹ Ceti	.	7	1 39 33.580	+0.280	−0.127	−0.010	+0.447	+0.007	34.177	2 7 9.632	35.455	+0.075
	ξ Persei	.	7	3 24 13.314	+0.334	−0.156	+0.017	+0.543	+0.129	14.181	3 51 49.619	35.438	+0.092
	γ Eridani . . .	.	7	3 25 17.753	+0.242	−0.154	−0.029	+0.455	+0.131	18.398	3 52 53.972	35.574	−0.044
	λ Tauri . .	E.	7	3 26 58.851	+0.287	−0.272	−0.007	+0.452	+0.133	59.444	3 54 35.082	+0 27 35.638	−0.108

NORMAL EQUATIONS.

$$
\begin{aligned}
&\text{Assuming } a' = -0^{s}.293 + da' \text{ circle W.} \\
&a'' = -0.162 + da'' \text{ ” E.} \\
&c = +0.452 + dc \text{ ” E.} \\
&\triangle T = +0^{h}\,27^{m}\,35^{s}.521 + dt.
\end{aligned}
\quad
\left\{
\begin{aligned}
0 &= +0.157 + 2.816\,da' \qquad\qquad + 2.751\,dc - 0.338\,dt \\
&-0.152 \qquad + 1.400\,da'' - 0.627\,dc + 0.218\,dt \\
&+0.105 + 2.751\,da' - 0.627\,da'' + 16.580\,dc - 2.508\,dt \\
&-0.128 - 0.338\,da' + 0.218\,da'' - 2.508\,dc + 10.377\,dt
\end{aligned}
\right\}
\quad
\begin{aligned}
\text{whence } da' &= -0^{s}.065 \\
da'' &= +0.111 \\
dc &= +0.010 \\
dt &= +0.010
\end{aligned}
$$

$a' = -0^{s}.358$ (circle west); $a'' = -0^{s}.051$ (circle east); $c = 0^{s}.462$ (+ with circle east).

Chronometer No. 1254, at $1^{h}\,33^{m}.2$ chron. time, $0^{h}\,27^{m}\,35^{s}.529 \pm 0^{s}.014$ slow, losing $0^{s}.070$ per hour.

Transits of stars observed at Port Plata, San Domingo, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 3	44 H. Cephi . .	E.	7	0 35 5. 300	+0. 764	+0. 073	+0. 731	+2. 339	—0. 066	9. 141	1 2 46. 356	—0 27[37. 215]	. . .
	τ Piscium . .	.	6	0 37 57. 206	+0. 321	+0. 030	+0. 031	+0. 509	—0. 062	58. 035	1 5 35. 221	37. 186	— 0. 013
	υ Piscium . . .	.	7	0 45 46. 342	+0. 314	+0. 030	+0. 022	+0. 496	—0. 053	47. 152	1 13 24. 337	37. 185	— 0. 012
	ψ Cassiop . .	.	7	0 50 30. 110	+0. 498	+0. 056	+0. 312	+1. 160	—0. 047	32. 089	1 18 9. 241	[37. 152]	. . .
	η Piscium . . .	.	7	0 57 57. 087	+0. 291	+0. 047	—0. 015	+0. 458	—0. 038	57. 830	1 25 35. 023	37. 193	— 0. 020
	40 Cassiop. . . .		7	1 2 3. 670	+0. 570	+0. 113	+0. 425	+1. 472	—0. 033	6. 217	1 29 43. 375	[37. 158]	. . .
	π Piscium .		7	1 3 37. 354	+0. 287	+0. 063	—0. 024	+0. 452	- 0. 031	38. 101	1 31 15. 232	37. 131	+ 0. 042
	ν Piscium . . .	E.	7	1 8 3. 777	+0. 275	+0. 071	- 0. 042	+0. 445	—0. 026	4. 500	1 35 41. 687	+0 27 37. 187	— 0. 014
	α Arietis . . .	W.	7	1 33 21. 531	—0. 307	—0. 099	+0. 015	—0. 524	+0. 005	20. 621	2 0 57. 734	+0 27 37. 113	+ 0. 060
	β Trianguli . .	.	7	1 35 23. 189	—0. 332	—0. 123	+0. 076	—0. 586	+0. 007	22. 231	2 2 59. 349	37. 118	+ 0. 055
	ξ¹ Ceti.	.	7	1 39 33. 374	—0. 280	—0. 129	—0. 050	—0. 488	+0. 013	32. 440	2 7 9. 622	37. 182	— 0. 009
	35 Arietis . . .	.	7	2 9 23. 036	—0. 315	—0. 101	+0. 036	—0. 543	+0. 049	22. 162	2 36 59. 359	37. 197	— 0. 024
	η Persei . . .		7	2 15 4. 151	—0. 405	—0. 124	+0. 253	—0. 851	+0. 056	3. 080	2 42 40. 281	[37. 201]	. .
	47 Cephei, H. . .	.	7	2 23 55. 560	—0. 759	—0. 215	+1. 119	—2. 528	+0. 067	53. 244	2 51 30. 500	[37. 256]	. . .
	α Ceti. .	W.	7	2 28 55. 034	—0. 272	—0. 074	—0. 069	—0. 484	+0. 073	54. 208	2 56 31. 446	+0 27 37. 238	- 0. 065

NORMAL EQUATIONS.

Assuming $a' = -0^s.162 + da'$ circle E.; $a'' = -0.233 + da''$ " W.; $c = +0.469 + dc$ " E.; $\triangle T = +0^h\,27^m\,37^s.173 + dt$.

$$\left\{\begin{aligned} 0 &= -0.027 + 3.708\,da' - 4.297\,dc - 1.082\,dt \\ &\quad +0.054 + 2.184\,da'' + 2.668\,dc - 0.850\,dt \\ &\quad +0.174 - 4.297\,da' + 2.668\,da'' + 20.624\,dc + 0.248\,dt \\ &\quad -0.029 - 1.082\,da' - 0.850\,da'' + 0.248\,dc + 11.049\,dt \end{aligned}\right\}$$

whence $da' = +0^s.001$; $da'' = -0.016$; $dc = -0.006$; $dt = +0.002$

$a' = -0^s.161$ (circle east); $a'' = -0^s.249$ (circle west); $c = 0^s.463$ (+ with circle east).

Chronometer No. 1254, at $1^h\,29^m.1$ chron. time, $0^h\,27^m\,37^s.173 \pm 0^s.008$ slow, losing $0^s.073$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 4	ε Piscium .	W.	7	0 29 34. 913	—0. 278	—0. 009	—0. 050	—0. 464	—0. 048	34. 064	0 57 13. 069	+0 27 39. 005	+ 0. 052
	44 H. Cephei .	.	7	0 35 9. 280	—0. 764	—0. 170	+1. 030	—2. 429	—0. 040	6. 907	1 2 46. 261	[39. 354]	. . .
	τ Piscium .	.	7	0 37 57. 117	—0. 321	—0. 093	+0. 044	—0. 529	—0. 036	56. 182	1 5 35. 211	39. 029	+ 0. 028
	f Piscium . . .		7	0 44 28. 456	—0. 271	—0. 104	—0. 066	—0. 460	—0. 026	27. 529	1 12 6. 590	39. 061	— 0. 004
	υ Piscium .		7	0 45 46. 166	—0. 314	—0. 121	+0. 030	—0. 515	—0. 024	45. 222	1 13 24. 324	39. 102	— 0. 045
	θ¹ Ceti. . . .		7	0 50 52. 496	— 0. 251	—0. 097	—0. 110	—0. 466	— 0. 017	51. 555	1 18 30. 670	39. 115	— 0. 058
	38 Cassiop. .		7	0 55 24. 829	—0. 525	—0. 186	+0. 500	—1. 325	—0. 011	23. 282	1 23 2. 169	[38. 887]	.
	η Piscium . .	W.	7	0 57 56. 849	—0. 291	—0. 094	—0. 021	—0. 476	—0. 007	55. 960	1 25 35. 011	+0 27 39. 051	+ 0. 006
	ν Piscium . .	E.	7	1 8 1. 866	+0. 274	0. 000	—0. 062	+0. 422	+0. 007	2. 507	1 35 41. 676	+0 27 39. 169	— 0. 112
	o Piscium .		7	1 11 54. 517	+0. 281	0. 000	—0. 047	+0. 425	+0. 013	55. 189	1 39 34. 366	39. 177	— 0. 120
	ε Cassiop. . .		7	1 18 47. 640	+0. 455	0. 000	+0. 363	+0. 929	+0. 023	49. 410	1 46 28. 508	[39. 098]	.
	γ Arietis . . .		7	1 19 49. 103	+0. 299	0. 000	—0. 005	+0. 443	+0. 024	49. 864	1 47 28. 689	38. 825	+ 0. 232
	β Arietis		7	1 20 53. 240	+0. 302	0. 000	+0. 002	+0. 448	+0. 026	54. 018	1 48 33. 102	39. 084	— 0. 027
	50 Cassiop. . .	.	7	1 26 20. 840	+0. 559	0. 000	+0. 606	+1. 351	+0. 034	23. 390	1 54 2. 511	[39. 121]	. . .
	α Arietis . .	E.	7	1 33 17. 896	+0. 307	0. 000	+0. 014	+0. 456	+0. 044	18. 717	2 0 57. 722	+0 27 39. 005	+ 0. 052

NORMAL EQUATIONS.

Assuming $a' = -0^s.242 + da'$ circle W.; $a'' = -0.208 + da''$ " E.; $c = +0.441 + dc$ " E.; $\triangle T = +0^h\,27^m\,39^s.048 + dt$.

$$\left\{\begin{aligned} 0 &= -0.042 + 2.914\,da' + 2.321\,dc - 0.036\,dt \\ &\quad +0.066 + 2.022\,da'' - 2.170\,dc - 0.554\,dt \\ &\quad -0.078 + 2.321\,da' - 2.170\,da'' + 19.363\,dc - 0.771\,dt \\ &\quad -0.126 - 0.036\,da' - 0.554\,da'' - 0.771\,dc + 11.801\,dt \end{aligned}\right\}$$

whence $da' = +0^s.015$; $da'' = -0.031$; $dc = -0.001$; $dt = +0.009$

$a' = -0^s.227$ (circle west); $a'' = -0^s.239$ (circle east); $c = 0^s.440$ (+ with circle east).

Chronometer No. 1254, at $1^h\,2^m.8$ chron. time, $0^h\,27^m\,39^s.057 \pm 0^s.020$ slow, losing $0^s.086$ per hour.

Transits of stars observed at Port Plata, San Domingo, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the crorection of sidereal cnronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 5	ε Piscium . . .	E.	7	0 29 31.563	+0.278	−0.090	−0.029	+0.387	−0.097	32.012	0 57 13.057	+0 27 41.045	+ 0.192
	β Andromedæ . .		7	0 35 51.747	+0.333	−0.108	+0.042	+0.469	−0.087	52.396	1 3 33.455	41.059	+ 0.178
	υ Piscium . . .	.	7	0 45 42.690	+0.314	−0.102	+0.018	+0.430	−0.073	43.277	1 13 24.310	41.033	+ 0.204
	40 Cassiop. .		4	1 1 59.978	+0.570	−0.189	+0.349	+1.276	−0.048	1.936	1 29 43.262	[41.326]	. . .
	π Piscium . .		7	1 3 33.473	+0.286	−0.095	−0.019	+0.392	−0.046	33.991	1 31 15.208	41.217	+ 0.020
	ξ¹ Ceti		7	1 39 27.666	+0.280	−0.096	−0.027	+0.388	+0.007	28.218	2 7 9.602	41.384	− 0.147
	γ Trianguli . .		7	1 43 3.881	+0.329	−0.114	+0.037	+0.460	+0.013	4.606	2 10 45.937	41.331	− 0.094
	θ Arietis . .	.	7	1 44 17.634	+0.300	−0.104	−0.001	+0.407	+0.015	18.251	2 11 59.827	41.576	− 0.339
	ι Cassiop. . . .	E.	7	1 52 17.090	+0.491	−0.174	+0.246	+0.979	+0.027	18.659	2 19 59.931	+0 27[41.272]	. . .
	δ Ceti	W.	7	2 6 9.681	−0.266	+0.004	−0.035	−0.424	+0.047	9.007	2 33 50.261	+0 27 41.254	− 0.017
	Br. 366 . . .		7	2 7 42.110	−0.496	0.000	+0.195	−1.101	+0.049	40.757	2 35 22.025	[41.268]	. . .
	35 Arietis . . .	.	7	2 9 18.846	−0.315	−0.004	+0.015	−0.477	+0.052	18.117	2 36 59.346	41.229	+ 0.008
	μ Ceti	.	7	2 11 18.704	−0.283	−0.006	−0.018	−0.430	+0.055	18.023	2 38 59.257	41.234	+ 0.003
	41 Arietis . . .	.	7	2 15 49.633	−0.315	−0.014	+0.014	−0.475	+0.062	48.905	2 43 30.107	41.202	+ 0.035
	γ Persei	.	7	2 29 9.380	−0.394	−0.025	+0.093	−0.706	+0.082	8.430	2 56 49.656	[41.226]	. .
	ζ Arietis . . .	W.	7	2 40 53.801	−0.302	+0.004	+0.002	−0.453	+0.099	53.151	3 8 34.427	+0 27 41.276	− 0.039

NORMAL EQUATIONS.

Assuming $a' = -0^s.205 + da'$ circle E.; $a'' = -0.125 + da''$ " W.; $c = +0.407 + dc$ " E.; $\triangle T = +0^h\,27^m\,41^s.233 + dt.$

$$\left\{\begin{array}{l} 0 = -0.160 + 2.180\,da' \qquad\qquad - 2.750\,dc - 1.015\,dt \\ \quad -0.027 \qquad\qquad + 1.580\,da'' + 1.903\,dc - 0.755\,dt \\ \quad +0.201 - 2.750\,da' + 1.903\,da'' + 20.513\,dc + 1.883\,dt \\ \quad +0.023 - 1.015\,da' - 0.755\,da'' + 1.883\,dc + 13.191\,dt \end{array}\right\}$$

whence $da' = +0^s.073$; $da'' = +0.023$; $dc = -0.003$; $dt = +0.006$

$a' = -0^s.132$ (circle east); $a'' = -0^s.102$ (circle west); $c = 0^s.404$ (+ with circle east).

Chronometer No. 1254, at $1^h\,34^m.4$ chron. time, $0^h\,27^m\,41^s.237 \pm 0^s.030$ slow, losing $0^s.089$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 6	υ Piscium . . .	W.	7	1 7 59.120	−0.275	+0.027	−0.027	−0.420	−0.057	58.368	1 35 41.654	+0 27 43.286	+ 0.095
	ο Piscium . . .		7	1 11 51.669	−0.281	+0.026	−0.020	−0.423	−0.052	50.919	1 39 34.344	43.425	− 0.044
	ε Cassiop.		7	1 18 46.290	−0.455	+0.032	+0.156	−0.925	−0.041	45.057	1 46 28.438	[43.381]	. . .
	β Arietis . . .		7	1 20 50.494	−0.302	+0.018	+0.001	−0.446	−0.038	49.727	1 48 33.078	43.351	+ 0.030
	50 Cassiop. .		7	1 26 20.760	−0.559	+0.012	+0.261	−1.344	−0.030	19.100	1 54 2.400	[43.300]	. . .
	α Arietis . . .	.	7	1 33 15.070	−0.307	−0.011	+0.006	−0.454	−0.020	14.284	2 0 57.698	43.414	− 0.033
	ξ¹ Ceti	.	7	1 39 26.917	−0.280	−0.028	−0.021	−0.423	−0.011	26.154	2 7 9.592	43.438	− 0.057
	γ Trianguli . .	.	7	1 43 3.343	−0.329	−0.047	+0.029	−0.500	−0.005	2.491	2 10 45.923	43.432	− 0.051
	θ Arietis . . .	W.	7	1 44 17.254	−0.300	−0.049	−0.001	−0.443	−0.003	16.458	2 11 59.819	+0 27 43.361	+ 0.020
	ν Arietis . . .	E.	7	2 4 49.616	+0.304	−0.078	+0.003	+0.406	+0.025	50.276	2 32 33.712	+0 27 43.436	− 0.055
	35 Arietis . . .	.	7	2 9 15.246	+0.315	−0.042	+0.038	+0.425	+0.033	16.015	2 36 59.339	43.324	+ 0.057
	μ Ceti	.	7	2 11 15.173	+0.282	−0.024	−0.047	+0.383	+0.036	15.803	2 38 59.248	43.445	− 0.064
	41 Arietis .	.	7	2 15 45.931	+0.315	−0.003	+0.036	+0.423	+0.043	46.745	2 43 30.095	43.350	+ 0.031
	σ Arietis	.	7	2 17 40.747	+0.291	0.000	−0.025	+0.390	+0.046	41.449	2 45 24.761	43.312	+ 0.069
	Gr. 716 .		7	3 4 51.680	+0.453	+0.005	+0.397	+0.829	+0.116	53.480	3 32 37.058	[43.578]	. . .
	γ Camelop. H. .	E.	7	3 11 0.120	+0.545	+0.096	+0.634	+1.160	+0.125	2.680	3 38 45.879	+0 27[43.199]	. . .

NORMAL EQUATIONS.

Assuming $a' = -0^s.115 + da'$ circle W.; $a'' = -0.200 + da''$ " E.; $c = +0.390 + dc$ " E.; $\triangle T = +0^h\,27^m\,43^s.380 + dt.$

$$\left\{\begin{array}{l} 0 = -0.059 + 2.140\,da' \qquad\qquad + 2.574\,dc - 0.645\,dt \\ \quad +0.150 \qquad\qquad + 1.949\,da'' - 2.588\,dc - 0.995\,dt \\ \quad -0.350 + 2.574\,da' - 2.588\,da'' + 20.642\,dc - 2.043\,dt \\ \quad -0.074 - 0.645\,da' - 0.995\,da'' - 2.043\,dc + 13.052\,dt \end{array}\right\}$$

whence $da' = +0^s.012$; $da'' = -0.065$; $dc = +0.008$; $dt = +0.002$

$a' = -0^s.103$ (circle west); $a'' = -0^s.265$ (circle east); $c = 0^s.398$ (+ with circle east).

Chronometer No. 1254, at $1^h\,46^m.6$ chron. time, $0^h\,27^m\,43^s.381 \pm 0^s.011$ slow, losing $0^s.089$ per hour.

Transits of stars observed at Curaçao, West Indies, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 20	17 Tauri	W.	7	3 2 53.323	−0.303	+0.090	−0.051	−0.498	−0.183	52.378	3 38 20.297	+0 35 27.919	−0.040
	η Tauri		7	3 5 29.476	−0.303	+0.099	−0.050	−0.498	−0.177	28.547	3 40 56.428	27.881	−0.002
	λ Tauri		7	3 19 7.891	−0.289	+0.123	0.000	−0.466	−0.150	7.109	3 54 34.948	27.839	+0.040
	ν Tauri		7	3 21 50.971	−0.283	+0.122	+0.026	−0.458	−0.144	50.234	3 57 18.128	27.894	−0.015
	o^1 Eridani	.	7	3 31 2.514	−0.269	+0.116	+0.076	−0.460	−0.127	1.850	4 6 29.711	27.861	+0.018
	γ Tauri		7	3 38 4.827	−0.293	+0.122	−0.014	−0.473	−0.111	4.058	4 13 31.900	27.842	+0.037
	δ Tauri		7	3 41 8.320	−0.295	+0.119	−0.022	−0.477	−0.105	7.540	4 16 35.345	27.805	+0.074
	Gr. 848		7	3 58 38.970	−0.510	+0.144	−0.833	−1.851	−0.069	35.851	4 34 3.810	[27.959]	. . .
	μ Eridani		7	4 4 32.891	−0.273	+0.065	+0.062	−0.457	−0.057	32.231	4 40 0.186	27.955	−0.076
	α Camelop.	W.	7	4 7 41.600	−0.411	+0.08	−0.458	−1.128	−0.050	39.640	4 43 7.484	+0 35 [27.844]	. . .
	22 Camelop. H.	E.	7	5 31 16.430	+0.434	−0.213	−0.849	+1.180	+0.121	17.103	6 6 44.826	+0 35 [27.723]	. . .
	η Geminorum	.	7	5 32 46.050	+0.301	−0.154	−0.070	+0.451	+0.124	46.702	6 8 14.638	27.936	−0.057
	μ Geminorum	.	7	5 40 50.146	+0.301	−0.179	−0.070	+0.451	+0.140	50.789	6 16 18.731	27.942	−0.063
	8 Monocerotis		7	5 42 28.193	+0.282	−0.170	+0.046	+0.417	+0.143	28.911	6 17 56.760	27.849	+0.030
	ν Geminorum		7	5 46 57.731	+0.298	−0.186	−0.054	+0.443	+0.153	58.385	6 22 26.260	27.875	+0.004
	23 H. Camelop.		7	5 52 2.350	+0.603	−0.383	−1.837	+2.323	+0.163	3.219	6 27 31.196	[27.977]	. . .
	ξ^2 Canis Majoris		7	5 54 58.699	+0.250	−0.160	+0.221	+0.451	+0.169	59.630	6 30 27.469	27.839	+0.040
	15 Monocerotis		7	5 59 27.030	+0.287	−0.182	+0.013	+0.422	+0.178	27.748	6 34 55.620	27.872	+0.007
	ξ Geminorum	E.	7	6 3 38.731	+0.290	−0.181	−0.006	+0.427	+0.187	39.448	6 39 7.330	+0 35 27.882	−0.003

NORMAL EQUATIONS.

Assuming
$a' = +0^s.191 + da'$ circle W.
$a'' = +0.377 + da''$ " E.
$c = +0.445 + dc$ " E.
$\triangle T = +0^h\,35^m\,27^s.885 + dt.$

$$\left\{\begin{array}{l} 0 = -0.092 + 2.953\,da' + 3.017\,dc - 0.864\,dt \\ +0.040 + 3.440\,da'' - 3.070\,dc - 0.623\,dt \\ +0.018 + 3.017\,da' - 3.070\,da'' + 23.743\,dc - 1.130\,dt \\ +0.122 - 0.864\,da' - 0.623\,da'' - 1.130\,dc + 15.680\,dt \end{array}\right.$$

whence $da' = +0^s.038$, $da'' = -0.021$, $dc = -0.009$, $dt = -0.007$

$a' = +0^s.229$ (circle west); $a'' = +0^s.356$ (circle east); $c = 0^s.436$ (+ with circle east).
Chronometer No. 1254, at $4^h\,32^m.3$ chron. time, $0^h\,35^m\,27^s.879 \pm 0^s.007$ slow, losing $0^s.123$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 21	ξ^2 Ceti	W.	7	1 46 48.229	−0.284	−0.025	+0.018	−0.433	−0.064	47.441	2 22 17.945	+0 35 30.504	−0.067
	36 H. Cassiop.	.	7	1 52 6.110	−0.463	−0.023	−0.686	−1.414	−0.055	3.469	2 27 34.285	[30.816]	. .
	ν Arietis	.	7	1 57 4.046	−0.300	−0.011	−0.042	−0.461	−0.046	3.186	2 32 33.522	30.336	+0.101
	δ Ceti	.	7	1 58 20.274	−0.276	−0.009	+0.051	−0.429	−0.043	19.568	2 33 50.082	30.514	−0.077
	Br. 3[illegible]6		7	1 59 53.214	−0.419	−0.013	−0.511	−1.114	−0.040	51.117	2 35 21.348	[30.231]	. . .
	γ Ceti	.	7	2 2 5.654	−0.282	−0.010	+0.039	−0.429	−0.036	4.936	2 37 35.435	30.499	−0.060
	μ Ceti		7	2 3 29.460	−0.287	−0.010	+0.011	−0.435	−0.034	28.707	2 38 59.073	30.366	+0.071
	σ Arietis		7	2 9 54.979	−0.292	−0.021	−0.011	−0.443	−0.022	54.190	2 45 24.572	30.382	+0.055
	47 Cephei, H.	W.	7	2 16 2.180	−0.582	−0.082	−1.154	−2.246	−0.011	58.105	2 51 28.478	+0 35 [30.373]	. . .
	δ Arietis	E.	7	2 29 48.646	+0.297	+0.062	−0.025	+0.412	+0.014	49.406	3 5 19.834	+0 35 30.428	+0.009
	ζ Arietis		7	2 33 2.980	+0.299	+0.069	−0.029	+0.416	+0.020	3.755	3 8 34.243	30.488	−0.051
	o Tauri	.	7	2 43 22.026	+0.286	+0.077	+0.011	+0.393	+0.039	22.832	3 18 53.236	30.404	+0.033
	ξ Tauri	.	7	2 45 40.803	+0.286	+0.077	+0.009	+0.394	+0.043	41.612	3 21 12.097	30.485	−0.048
	f Tauri		7	2 49 16.389	+0.290	+0.078	−0.001	+0.398	+0.049	17.203	3 24 47.602	30.399	+0.038
	Gr. 716	.	7	2 57 5.070	+0.392	+0.097	−0.314	+0.853	+0.063	6.161	3 32 36.630	[30.469]	. . .
	γ Camelop. H.		7	3 3 13.520	+0.449	+0.095	−0.486	+1.195	+0.075	14.848	3 38 45.242	[30.394]	. . .
	27 Tauri	E.	7	3 7 5.729	+0.303	+0.053	−0.041	+0.425	+0.082	6.551	3 42 36.994	+0 35 30.443	−0.006

NORMAL EQUATIONS.

Assuming
$a' = +0^s.248 + da'$ circle W.
$a'' = +0.176 + da''$ " E.
$c = +0.414 + dc$ " E.
$\triangle T = +0^h\,35^m\,30^s.437 + dt.$

$$\left\{\begin{array}{l} 0 = +0.055 + 4.319\,da' + 4.558\,dc - 0.423\,dt \\ -0.034 + 2.416\,da'' - 3.276\,dc - 1.498\,dt \\ +0.168 + 4.558\,da' - 3.276\,da'' + 21.822\,dc - 0.122\,dt \\ -0.010 - 0.423\,da' - 1.498\,da'' - 0.122\,dc + 13.035\,dt \end{array}\right.$$

whence $da' = -0^s.008$, $da'' = +0.009$, $dc = -0.005$, $dt = +0.001$

$a' = +0^s.240$ (circle west); $a'' = +0^s.185$ (circle east); $c = 0^s.409$ (+ with circle east).
Chronometer No. 1254, at $2^h\,22^m.1$ chron. time, $0^h\,35^m\,30^s.437 \pm 0^s.012$ slow, losing $0^s.109$ per hour.

Transits of stars observed at Curaçao, West Indies, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 22	o^1 Eridani	W.	7	3 30 57.430	—0.269	+0.040	—0.060	—0.495	—0.276	56.370	4 6 29.691	+0 35 33.321	—0.058
	ν Orionis . . .		7	5 25 45.446	—0.292	—0.035	+0.009	—0.508	—0.080	44.540	6 1 17.846	33.306	—0.043
	μ Geminorum . .	.	7	5 40 46.327	—0.301	—0.011	+0.036	—0.532	—0.055	45.464	6 16 18.730	33.266	—0.003
	8 Monocerotis . .	.	7	5 42 24.267	—0.282	—0.008	—0.024	—0.492	—0.052	23.409	6 17 56.757	33.348	—0.085
	ν Geminorum . .	.	7	5 46 53.837	—0.299	0.000	+0.027	—0.523	—0.044	52.998	6 22 26.258	33.260	+0.003
	23 H. Camelop. .		6	5 52 0.196	—0.603	+0.015	+0.934	—2.742	—0.035	57.765	6 27 31.147	[33.382]	. . .
	γ Geminorum . .		7	5 55 49.499	—0.291	+0.014	+0.014	—0.512	—0.029	48.695	6 31 21.821	33.126	+0.137
	ε Geminorum . .		7	6 1 37.781	—0.305	+0.024	+0.045	—0.543	—0.019	36.983	6 37 10.266	33.283	—0.020
	ξ Geminorum .	W.	7	6 3 34.890	—0.290	+0.026	+0.003	—0.504	—0.016	34.109	6 39 7.332	+0 35 33.223	+0.040
	λ Geminorum . .	E.	7	6 36 12.713	+0.295	—0.044	—0.019	+0.471	+0.039	13.455	7 11 46.749	+0 35 33.294	—0.031
	δ Geminorum . .	.	7	6 37 59.771	+0.301	—0.046	—0.044	+0.487	+0.042	0.511	7 13 33.694	33.183	+0.080
	β Canis Minoris. .		7	6 45 37.627	+0.285	—0.049	+0.015	+0.456	+0.055	38.389	7 21 11.634	33.245	+0.018
	a Canis Minoris.	.	7	6 57 59.063	+0.282	—0.059	+0.027	+0.453	+0.076	59.843	7 33 33.167	33.324	—0.061
	κ Geminorum . .		7	7 2 14.951	+0.304	—0.065	—0.055	+0.496	+0.084	15.715	7 37 48.915	33.200	+0.063
	Gr. 1374 . . .		7	7 11 29.360	+0.487	—0.115	—0.753	+1.657	+0.099	30.735	7 47 3.965	[33.230]	. .
	53 Camelop. . .		7	7 16 45.660	+0.382	—0.094	—0.354	+0.920	+0.109	46.623	7 52 20.022	[33.399]	. .
	15 Argus (ρ)	E.	7	7 27 18.110	+0.250	—0.067	+0.150	+0.494	+0.126	19.063	8 2 52.371	+0 35 33.308	—0.045

NORMAL EQUATIONS.

$$\begin{array}{ll} \text{Assuming } a' = -0^s.203 + da' \text{ circle W.} & \\ a'' = +0.221 + da'' \quad \text{" E.} & \\ c = +0.459 + dc \quad \text{" E.} & \\ \triangle T = +0^h\,35^m\,33^s.251 + dt. & \end{array}
\left\{\begin{array}{l} 0 = -0.056 + 1.858\,da' \qquad\qquad + 2.065\,dc - 0.591\,dt \\ \quad +0.010 \qquad\qquad + 2.894\,da'' - 2.524\,dc - 0.729\,dt \\ \quad -0.253 + 2.065\,da' - 2.524\,da'' + 20.809\,dc - 1.071\,dt \\ \quad -0.202 - 0.591\,da' - 0.729\,da'' - 1.071\,dc + 14.586\,dt \end{array}\right\}
\begin{array}{l} \text{whence } da' = +0^s.022 \\ da'' = +0.011 \\ dc = +0.012 \\ dt = +0.016 \end{array}$$

$a' = -0^s.181$ (circle west); $a'' = +0^s.232$ (circle east); $c = 0^s.471$ (+ with circle east).

Chronometer No. 1254, at $6^h\,13^m.1$ chron. time, $0^h\,35^m\,33^s.263 \pm 0^s.011$ slow, losing $0^s.102$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 23	δ Arietis	W.	7	2 29 45.350	—0.297	—0.060	—0.022	—0.470	—0.104	44.397	3 5 19.807	+0 35 35.410	+0.095
	ζ Arietis		7	2 32 59.760	—0.299	—0.074	—0.026	—0.474	—0.098	58.789	3 8 34.215	35.426	+0.079
	f Tauri . . .	.	7	2 49 12.971	—0.290	—0.123	—0.001	—0.454	—0.068	12.035	3 24 47.574	35.539	—0.034
	ε Eridani . . .		7	2 52 9.896	—0.266	—0.119	+0.063	—0.450	—0.063	9.061	3 27 44.580	35.519	—0.014
	Gr. 716 . . .	.	7	2 57 2.910	—0.392	—0.184	—0.284	—0.971	—0.054	1.025	3 32 36.568	[35.543]	. .
	γ Camelop., H. .	.	7	3 3 12.100	—0.449	—0.219	—0.439	—1.360	—0.042	9.591	3 38 45.142	[35.551]	. .
	λ Tauri		7	3 19 0.299	—0.289	—0.143	0.000	—0.453	—0.013	59.401	3 54 34.914	35.513	—0.008
	ν Tauri	W.	7	3 21 43.350	—0.283	—0.140	+0.019	—0.445	—0.008	42.493	3 57 18.094	+0 35 35.601	—0.096
	o^1 Eridani	E.	7	3 30 53.399	+0.269	0.000	+0.111	+0.406	+0.008	54.193	4 6 29.681	+0 35 35.488	+0.017
	γ Tauri	.	7	3 37 55.590	+0.293	0.000	—0.020	+0.418	+0.021	56.302	4 13 31.870	35.568	—0.063
	δ Tauri	.	7	3 40 59.106	+0.295	0.000	—0.031	+0.422	+0.027	59.819	4 16 35.318	35.499	+0.006
	ε Tauri	.	7	3 46 35.271	+0.294	0.000	—0.042	+0.426	+0.037	35.986	4 22 11.485	35.499	+0.006
	a Tauri	.	7	3 54 0.220	+0.294	0.000	—0.025	+0.420	+0.051	0.960	4 29 36.455	35.495	+0.010
	μ Eridani	.	7	4 4 23.849	+0.273	0.000	+0.090	+0.404	+0.070	24.686	4 40 0.163	35.477	+0.028
	a Camelop. . . .	.	7	4 7 31.340	+0.411	0.000	—0.671	+0.997	+0.075	32.152	4 43 7.400	[35.248]	. . .
	π^5 Orionis	.	7	4 12 55.004	+0.279	0.000	+0.057	+0.403	+0.085	55.828	4 48 31.360	35.532	—0.027
	10 Camelop. . . .	E.	7	4 18 2.010	+0.380	0.000	—0.503	+0.813	+0.095	2.795	4 53 38.527	+0 35[35.732]	. .

NORMAL EQUATIONS.

$$\begin{array}{ll} \text{Assuming } a' = +0^s.145 + da' \text{ circle W.} & \\ a'' = +0.298 + da'' \quad \text{" E.} & \\ c = +0.432 + dc \quad \text{" E.} & \\ \triangle T = +0^h\,35^m\,35^s.505 + dt. & \end{array}
\left\{\begin{array}{l} 0 = -0.028 + 2.519\,da' \qquad\qquad + 2.652\,dc - 0.898\,dt \\ \quad -0.102 \qquad\qquad + 2.261\,da'' - 2.182\,dc - 0.738\,dt \\ \quad +0.201 + 2.652\,da' - 2.182\,da'' + 20.586\,dc + 1.144\,dt \\ \quad +0.016 - 0.898\,da' - 0.738\,da'' + 1.144\,dc + 14.211\,dt \end{array}\right\}
\begin{array}{l} \text{whence } da' = +0^s.022 \\ da'' = +0.037 \\ dc = -0.009 \\ dt = +0.007 \end{array}$$

$a' = +0^s.167$ (circle west); $a'' = +0^s.335$ (circle east); $c = 0^s.423$ (+with circle east).

Chronometer No. 1254, at $3^h\,26^m.3$ chron. time, $0^h\,35^m\,35^s.505 \pm 0^s.096$ slow, losing $0^s.110$ per hour.

Transits of stars observed at Curaçao, West Indies, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Jan. 24	α Ceti	W.	7	2 20 53.787	—0.280	+0.050	+0.009	—0.422	—0.113	53.031	2 56 31.217	+0 35 38.186	+ 0.064
	ζ Arietis		6	2 32 56.876	—0.299	+0.051	—0.009	—0.450	—0.090	56.079	3 8 34.201	38.122	+ 0.128
	o Tauri		7	2 43 15.657	—0.286	+0.043	+0.003	—0.426	—0.070	14.921	3 18 53.198	38.277	— 0.027
	ξ Tauri		7	2 45 34.490	—0.286	+0.041	+0.003	—0.426	—0.065	33.757	3 21 12.051	38.294	— 0.044
	f Tauri		7	2 49 10.050	—0.290	+0.039	0.000	—0.431	—0.059	9.309	3 24 47.560	38.251	— 0.001
	Gr. 716		7	2 56 59.660	—0.392	+0.040	—0.102	—0.923	—0.043	58.240	3 32 36.537	[38.297]	.
	δ Eridani		7	3 2 20.853	—0.268	+0.022	+0.022	—0.428	—0.033	20.168	3 37 58.487	38.319	— 0.069
	η Tauri		7	3 5 18.914	—0.303	+0.019	—0.013	—0.460	—0.027	18.130	3 40 56.379	38.249	+ 0.001
	27 Tauri		7	3 6 59.423	—0.303	+0.017	—0.013	—0.460	—0.024	58.640	3 42 36.944	38.304	— 0.054
	9 H. Camelop.	W.	7	3 12 8.540	—0.383	+0.011	—0.092	—0.863	—0.014	7.199	3 47 45.455	+0 35 [38.256]	. .
	o¹ Eridani	E.	7	3 30 50.641	+0.269	—0.024	+0.036	+0.384	+0.022	51.328	4 6 29.670	+0 35 38.342	— 0.092
	γ Tauri		6	3 37 52.893	+0.293	0.000	—0.006	+0.395	+0.036	53.611	4 13 31.859	38.248	+ 0.002
	δ Tauri		7	3 40 56.404	+0.295	+0.014	—0.010	+0.399	+0.042	57.144	4 16 35.308	38.164	+ 0.086
	α Tauri		7	3 53 57.409	+0.294	+0.044	—0.008	+0.397	+0.066	58.202	4 29 36.445	38.243	+ 0.007
	ν Eridani		7	3 55 10.299	+0.273	+0.041	+0.029	+0.382	+0.069	11.093	4 30 49.313	38.220	+ 0.030
	τ Tauri		7	3 59 59.421	+0.302	+0.038	—0.021	+0.413	+0.078	0.231	4 35 38.509	38.278	— 0.028
	α Camelop.		7	4 7 27.760	+0.411	+0.025	—0.214	+0.943	+0.093	29.018	4 43 7.370	[38.352]	. .
	π⁵ Orionis		7	4 12 52.317	+0.279	—0.007	+0.018	+0.381	+0.103	53.091	4 48 31.350	38.259	— 0.009
	10 Camelop.	E.	7	4 17 59.250	+0.380	—0.046	—0.161	+0.768	+0.113	0.304	4 53 38.506	+0 35 [38.202]	.

NORMAL EQUATIONS.

Assuming
$a' = +0^s.087 + da'$ circle W.
$a'' = +0.074 + da''$ " E.
$c = +0.388 + dc$ " E.
$\triangle T = +0^h\,35^m\,38.247 + dt.$

$$\begin{aligned} 0 &= +0.032 + 2.189\,da' \qquad\qquad\qquad + 2.520\,dc - 1.158\,dt \\ &\quad -0.042 \qquad\qquad + 2.286\,da'' - 2.264\,dc - 0.810\,dt \\ &\quad -0.149 + 2.520\,da' - 2.264\,da'' + 22.709\,dc - 1.152\,dt \\ &\quad -0.075 - 1.158\,da' - 0.810\,da'' - 1.152\,dc + 16.404\,dt \end{aligned}$$

whence
$da' = -0^s.027$
$da'' = +0.033$
$dc = +0.013$
$dt = +0.005$

$a' = +0^s.060$ (circle west); $a'' = +0^s.107$ (circle east); $c = 0^s.401$ (+ with circle east).

Chronometer No. 1254, at $3^h\,19^m.4$ chron. time, $0^h\,35^m\,38^s.250 \pm 0^s.010$ slow, losing $0^s.116$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Jan. 25	δ Arietis	W.	7	2 29 39.634	—0.297	0.000	+0.002	—0.498	—0.101	38.740	3 5 19.780	+0 35 41.040	— 0.017
	ζ Arietis		7	2 32 54.090	—0.299	0.000	+0.002	—0.502	—0.095	53.196	3 8 34.187	40.991	+ 0.032
	o Tauri		7	2 43 12.943	—0.286	0.000	—0.001	—0.475	—0.075	12.106	3 18 53.185	41.079	— 0.056
	ε Eridani		7	2 52 4.279	—0.266	0.000	—0.005	—0.477	—0.058	3.473	3 27 44.554	41.081	— 0.058
	Gr. 716		7	2 56 56.810	—0.392	0.000	+0.024	—1.030	—0.049	55.363	3 32 36.506	[41.143]	. . .
	η Tauri		7	3 5 16.261	—0.303	—0.006	+0.003	—0.514	—0.033	15.408	3 40 56.366	40.958	+ 0.065
	27 Tauri		7	3 6 56.787	—0.303	—0.007	+0.003	—0.513	—0.030	55.937	3 42 36.924	40.987	+ 0.036
	9 H. Camelop.		7	3 12 5.790	—0.383	—0.016	+0.021	—0.963	—0.020	4.429	3 47 45.424	[40.995]	. . .
	λ Tauri	W.	7	3 18 54.701	—0.289	—0.017	0.000	—0.481	—0.007	53.907	3 54 34.892	+0 35 40.985	+ 0.038
	o¹ Eridani	E.	7	3 30 47.897	+0.269	+0.012	+0.044	+0.433	+0.015	48.670	4 6 29.659	+0 35 40.989	+ 0.034
	γ Tauri		7	3 37 50.021	+0.293	—0.019	—0.008	+0.446	+0.029	50.762	4 13 31.848	41.086	— 0.063
	δ Tauri		7	3 40 53.521	+0.295	—0.028	—0.013	+0.450	+0.034	54.259	4 16 35.296	41.037	— 0.014
	ε Tauri		7	3 46 29.681	+0.294	—0.044	—0.017	+0.454	+0.045	30.413	4 22 11.465	41.052	— 0.029
	α Tauri		7	3 53 54.664	+0.294	—0.047	—0.010	+0.448	+0.059	55.408	4 29 36.435	41.027	— 0.004
	Gr. 848		7	3 58 20.750	+0.510	—0.086	—0.487	+1.746	+0.068	22.501	4 34 3.532	[41.031]	. .
	μ Eridani		7	4 4 18.337	+0.273	—0.037	+0.036	+0.431	+0.079	19.119	4 40 0.146	41.027	— 0.004
	α Camelop.		7	4 7 25.220	+0.411	—0.048	—0.268	+1.064	+0.085	26.464	4 43 7.340	[40.876]	. . .
	π⁵ Orionis		7	4 12 49.559	+0.279	—0.024	+0.023	+0.430	+0.095	50.362	4 48 31.340	40.978	+ 0.045
	10 Camelop.	E.	7	4 17 56.240	+0.380	—0.023	—0.201	+0.867	+0.105	57.368	4 53 38.484	+0 35 [41.116]	— 0.093

NORMAL EQUATIONS.

Assuming
$a' = -0^s.024 + da'$ circle W.
$a'' = +0.098 + da''$ " E.
$c = +0.464 + dc$ " E.
$\triangle T = +0^h\,35^m\,41^s.020 + dt$

$$\begin{aligned} 0 &= +0.025 + 2.192\,da' \qquad\qquad\qquad + 2.841\,dc - 1.469\,dt \\ &\quad -0.182 \qquad\qquad + 3.783\,da'' - 3.881\,dc - 1.156\,dt \\ &\quad +0.443 + 2.841\,da' - 3.881\,da'' + 23.637\,dc + 0.245\,dt \\ &\quad -0.005 - 1.469\,da' - 1.156\,da'' + 0.245\,dc + 15.519\,dt \end{aligned}$$

whence
$da' = +0^s.010$
$da'' = +0.036$
$dc = -0.014$
$dt = +0.004$

$a' = -0^s.014$ (circle west); $a'' = +0^s.134$ (circle east); $c = 0^s.450$ (+ with circle east).

Chronometer No. 1254, at $3^h\,23^m.7$ chron. time, $0^h\,35^m\,41^s.023 \pm 0^s.008$ slow, losing $0^s.114$ per hour.

Transits of stars observed at La Guayra, Venezuela, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
1890.				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
Feb. 7	γ Tauri	E.	7	3 29 18.566	+0.293	+0.043	−0.047	+0.197	−0.037	19.015	4 13 31.675	+0 44 12.660	−0.084
	δ Tauri	.	7	3 32 22.039	+0.294	+0.052	−0.067	+0.199	−0.034	22.483	4 16 35.127	12.644	−0.068
	ε Tauri	.	7	3 37 58.313	+0.296	+0.063	−0.084	+0.201	−0.029	58.760	4 22 11.295	12.535	+0.041
	υ Tauri	.	7	3 45 23.134	+0.293	+0.065	−0.056	+0.198	−0.023	23.611	4 29 36.264	12.653	−0.077
	ν Eridani		7	3 46 36.050	+0.275	+0.060	+0.134	+0.190	−0.022	36.687	4 30 49.137	12.450	+0.126
	τ Tauri	.	7	3 51 25.307	+0.300	+0.057	−0.124	+0.206	−0.017	25.729	4 35 38.325	12.596	−0.020
	μ Eridani		7	3 55 46.824	+0.275	+0.043	−0.133	+0.190	−0.014	47.451	4 39 59.985	12.534	+0.042
	α Camelop.		7	3 58 54.840	+0.386	+0.045	−1.127	+0.470	−0.011	54.603	4 43 6.870	[12.267]	. .
	π⁴ Orionis	.	7	4 1 7.539	+0.283	+0.024	+0.050	+0.191	−0.009	8.078	4 45 20.689	12.611	−0.035
	10 Camelop.	E.	7	4 9 25.470	+0.369	−0.022	−0.840	+0.383	−0.001	25.359	4 53 38.135	+0 44 [12.776]	. . .
	ε Leporis	W.	7	4 16 35.980	−0.256	+0.031	+0.207	−0.249	+0.005	35.718	5 0 48.389	+0 44 12.671	−0.095
	19 H. Camelop.		7	4 20 18.100	−0.549	+0.068	−1.718	−1.217	+0.014	14.698	5 4 27.410	[12.712]	. .
	17 Camelop.		7	4 35 36.020	−0.380	+0.056	−0.608	−0.506	+0.022	34.604	5 19 47.246	[12.642]	. . .
	φ¹ Orionis		7	4 44 34.870	−0.287	+0.120	+0.007	−0.233	+0.030	34.507	5 28 46.950	12.443	+0.133
	ζ Tauri		7	4 46 52.266	−0.298	+0.068	−0.068	−0.247	+0.032	51.753	5 31 4.292	13.539	+0.037
	σ Orionis		7	4 49 1.227	−0.276	+0.049	+0.080	−0.230	+0.034	0.884	5 33 13.541	12.657	−0.081
	130 Tauri		7	4 56 49.453	−0.295	+0.035	−0.045	−0.241	+0.041	48.948	5 41 1.451	12.503	+0.073
	α Orionis	W.	7	5 5 1.000	−0.285	+0.030	+0.020	−0.232	+0.048	0.581	5 49 13.150	+0 44 12.569	+0.007

NORMAL EQUATIONS.

Assuming
$$a' = +0^s.520 + da' \text{ circle E.}$$
$$a'' = +0.336 + da'' \text{ " W.}$$
$$c = +0.228 + dc \text{ " E.}$$
$$\triangle T = +0^h 44^m 12^s.564 + dt.$$

$$\left\{\begin{array}{l} 0 = -0.094 + 2.366\,da' \qquad\qquad - 2.809\,dc - 1.297\,dt \\ \quad +0.009 \qquad\qquad + 3.196\,da'' + 2.530\,dc - 0.365\,dt \\ \quad +0.403 - 2.809\,da' + 2.530\,da'' + 21.971\,dc + 2.412\,dt \\ \quad -0.126 - 1.297\,da' - 0.365\,da'' + 2.412\,dc + 15.087\,dt \end{array}\right\}$$

whence
$$da' = +0^s.026$$
$$da'' = +0.013$$
$$dc = -0.018$$
$$dt = +0.014$$

$a' = +0^s.546$ (circle east); $a'' = +0^s.349$ (circle west); $c = 0^s.210$ (+ with circle east).

Chronometer No. 1254, at $4^h\ 10^m.9$ chron. time, $0^h\ 44^m\ 12^s.576 \pm 0^s.014$ slow, losing $0^s.053$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
Feb. 8	ε Tauri	E.	7	3 37 57.180	+0.296	−0.100	−0.088	+0.252	−0.033	57.507	4 22 11.280	+0 44 13.673	+0.069
	α Tauri	.	7	3 45 21.946	+0.293	−0.111	−0.059	+0.248	−0.027	22.290	4 29 36.250	13.960	−0.118
	ν Eridani	.	7	3 46 34.753	+0.275	−0.110	+0.141	+0.238	−0.026	35.271	4 30 49.122	13.851	−0.009
	Gr. 848	.	7	3 49 49.440	+0.483	−0.208	−2.115	+0.967	−0.023	48.544	4 34 2.608	[14.064]	. . .
	τ Tauri		7	3 51 24.100	+0.300	−0.134	−0.131	+0.258	−0.021	24.372	4 35 38.310	13.938	−0.096
	α Camelop.		7	3 58 53.550	+0.386	−0.153	−1.185	+0.589	−0.014	53.173	4 43 6.830	[13.657]	. . .
	i Tauri	.	7	4 0 41.963	+0.296	−0.108	−0.085	+0.251	−0.013	42.304	4 44 56.160	13.856	−0.014
	π⁵ Orionis	E.	7	4 4 16.837	+0.280	−0.083	+0.083	+0.238	−0.009	17.346	4 48 31.181	+0 44 13.835	+0.007
	11 Orionis	W.	7	4 14 3.720	−0.292	−0.103	−0.050	−0.288	0.000	2.987	4 58 16.870	+0 44 13.883	−0.041
	ε Leporis	.	7	4 16 34.787	−0.256	−0.085	+0.353	−0.301	+0.002	34.500	5 0 48.373	13.873	−0.031
	β Eridani		7	4 18 13.154	−0.273	−6.085	+0.164	−0.279	+0.003	12.684	5 2 26.510	13.826	+0.016
	17 Camelop.	.	7	4 35 35.340	−0.380	−0.062	−1.040	−0.612	+0.019	33.265	5 19 47.215	[13.950]	. .
	θ² Orionis	.	7	4 45 45.521	−0.273	−0.048	+0.167	−0.279	+0.029	45.117	5 29 58.901	13.784	+0.058
	ζ Tauri		7	4 46 51.131	−0.298	−0.055	−0.116	−0.298	+0.030	50.394	5 31 4.280	13.886	−0.044
	σ Orionis	.	7	4 49 0.183	−0.276	−0.053	+0.137	−0.278	+0.032	59.745	5 33 13.528	13.783	+0.059
	α Columbæ		7	4 51 26.614	−0.243	−0.050	+0.507	−0.336	+0.034	26.526	5 35 40.480	[13.954]	. . .
	130 Tauri	W.	7	4 56 48.341	−0.295	−0.075	−0.077	−0.292	+0.039	47.640	5 41 1.439	+0 44 13.799	+0.943

NORMAL EQUATIONS.

Assuming
$$a' = +0^s.603 + da' \text{ circle E.}$$
$$a'' = +0.396 + da'' \text{ " W.}$$
$$c = +0.283 + dc \text{ " E.}$$
$$\triangle T = +0^h 44^m 13^s.850 + dt.$$

$$\left\{\begin{array}{l} 0 = -0.001 + 2.948\,da' \qquad\qquad - 3.437\,dc - 1.245\,dt \\ \quad -0.496 \qquad\qquad + 2.379\,da'' - 0.709\,dc + 1.221\,dt \\ \quad +0.565 - 3.437\,da' - 0.709\,da'' + 20.747\,dc - 1.809\,dt \\ \quad -0.337 - 1.245\,da' + 1.221\,da'' - 1.809\,dc + 14.738\,dt \end{array}\right\}$$

whence
$$da' = -0^s.029$$
$$da'' = +0.201$$
$$dc = -0.025$$
$$dt = +0.001$$

$a' = +0^s.574$ (circle east); $a'' = +0^s.597$ (circle west); $c = 0^s.258$ (+ with circle east).

Chronometer No. 1254, at $4^h\ 14^m.5$ chron. time, $0^h\ 44^m\ 13^s.842 \pm 0^s.011$ slow, losing $0^s.055$ per hour.

Transits of stars observed at La Guayra, Venezuela, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v*.
				h. m. s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*h. m. s.*	*h. m. s.*	*s.*
1890. Feb. 9.	19 H. Camelop. .	E.	7	4 20 13.240	+0.549	−0.033	−1.954	+0.804	−0.056	12.550	5 4 27.231	+0 44[14.681]	. .
	η Orionis . . .	.	7	4 34 41.183	+0.276	−0.037	+0.090	+0.152	−0.042	41.622	5 18 56.766	15.144	+0.122
	Gr. 966 . . .		7	4 40 47.350	+0.472	−0.023	−1.380	+0.586	−0.037	46.968	5 25 2.589	[15.621]	. .
	α Leporis . .		7	4 43 37.090	+0.261	−0.007	+0.199	+0.160	−0.034	37.669	5 27 52.916	15.247	+0.019
	σ Orionis . . .		7	4 48 57.794	+0.276	0.000	+0.091	+0.152	−0.029	58.284	5 33 13.513	15.229	+0.037
	α Orionis. .	.	7	5 5 57.380	+0.285	−0.017	+0.023	+0.153	−0.013	57.811	5 49 13.129	15.318	−0.052
	66 Orionis . . .		7	5 14 54.100	+0.282	−0.033	+0.045	+0.152	−0.004	54.542	5 59 9.856	15.314	−0.048
	ν Orionis . . .	E.	7	5 17 1.957	+0.292	−0.039	−0.030	+0.157	−0.003	2.334	6 1 17.729	+0 44 15.395	−0.129
	μ Geminorum	W.	7	5 32 3.959	−0.300	+0.020	−0.140	−0.208	+0.011	3.342	6 16 18.621	+0.44 15.279	−0.013
	8 Monocerotis		7	5 33 41.726	−0.282	+0.026	+0.065	−0.193	+0.012	41.354	6 17 56.658	15.304	−0.038
	ν Geminorum	.	7	5 38 11.466	−0.297	+0.045	−0.112	−0.205	+0.017	10.914	6 22 26.170	15.256	+0.010
	8 Lyncis . .	.	7	5 43 25.471	−0.374	+0.079	−1.020	−0.403	+0.021	23.774	6 27 39.036	[15.262]	. . .
	ξ^2 Canis Majoris.	.	7	5 46 11.959	−0.256	+0.060	+0.375	−0.208	+0.024	11.954	6 30 27.318	15.364	−0.098
	γ Geminorum	.	7	5 47 7.007	−0.293	+0.070	−0.067	−0.200	+0.025	6.542	6 31 21.752	15.210	+0.056
	15 Monocerotis .	.	7	5 50 40.777	−0.287	+0.076	+0.007	−0.195	+0.028	40.406	6 34 55.538	15.132	+0.134
	43 Camelop. . .	W.	7	5 57 38.864	−0.414	+0.126	−1.487	−0.536	+0.035	36.587	6 41 51.964	+0.44[15.377]	. . .

NORMAL EQUATIONS.

Assuming $a' = +0^s.418 + da'$ circle E. ; $a'' = +0.637 + da''$ " W. ; $c = +0.190 + dc$ " E. ; $\triangle T = +0^h 44^m 15^s.259 + dt$.

$$\left\{\begin{aligned} 0 &= +0.030 + 3.598\,da' \qquad\qquad - 2.436\,dc + 0.271\,dt \\ &\quad +0.079 \qquad\qquad + 2.730\,da'' + 2.553\,dc - 0.938\,dt \\ &\quad +0.345 - 2.436\,da' - 2.553\,da'' + 20.043\,dc - 0.750\,dt \\ &\quad -0.128 + 0.271\,da' + 0.938\,da'' - 0.750\,dc + 12.792\,dt \end{aligned}\right\}$$

whence $da' = -0^s.021$, $da'' = -0.011$, $dc = -0.018$, $dt = +0.007$

$a' = +0^s.397$ (circle east); $a'' = +0^s.626$ (circle west); $c = 0^s.172$ (+ with circle east).

Chronometer No. 1254, at $5^h\ 19^m.3$ chron. time, $0^h\ 44^m\ 15^s.266 \pm 0^s.016$ slow, losing $0^s.055$ per hour.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	*v*.
Feb. 10.	α Tauri	E.	7	3 45 19.374	+0.293	−0.044	−0.039	+0.162	−0.040	19.706	4 29 36.222	+0 44 16.516	+0.037
	ν Eridani . . .		7	3 46 32.213	+0.275	−0.052	+0.093	+0.155	−0.039	32.645	4 30 49.091	16.446	+0.107
	53 Eridani . .		7	3 48 51.350	+0.265	−0.065	+0.166	+0.160	−0.036	51.840	4 33 8.350	16.510	+0.043
	τ Tauri		7	3 51 21.410	+0.300	−0.090	−0.086	+0.168	−0.034	21.668	4 35 38.280	16.612	−0.059
	α Camelop. . .		7	3 58 50.400	+0.386	−0.160	−0.780	+0.383	−0.026	50.203	4 43 6.746	[16.543]	. . .
	i Tauri . . .		7	4 0 39.260	+0.296	−0.127	−0.056	+0.164	−0.024	39.513	4 44 56.132	16.619	−0.066
	π^6 Orionis . . .		7	4 4 14.144	+0.280	−0.129	+0.055	+0.155	−0.021	14.484	4 48 31.153	16.669	−0.116
	10 Camelop. . .	E.	7	4 9 21.657	+0.369	−0.179	−0.581	+0.313	−0.015	21.564	4 53 38.042	+0.44[16.478]	. . .
	17 Camelop. .	W.	7	4 35 32.229	−0.380	0.000	−0.523	−0.429	+0.011	30.908	5 19 47.152	+0.44[16.244]	. . .
	Gr. 966 . .		7	4 40 47.607	−0.472	+0.038	−1.043	−0.752	+0.017	45.395	5 25 2.528	[17.133]	. . .
	δ Orionis . .	.	7	4 42 7.027	−0.278	+0.027	+0.057	−0.195	+0.018	6.656	5 26 23.264	16.608	−0.055
	α Leporis . . .		7	4 43 36.549	−0.261	+0.029	+0.151	−0.205	+0.019	36.282	5 27 52.902	16.620	−0.067
	φ^1 Orionis . .		7	4 44 30.851	−0.287	+0.034	+0.006	−0.198	+0.020	30.426	5 28 46.906	16.480	+0.073
	θ^2 Orionis . . .	.	7	4 45 42.637	−0.273	+0.036	+0.084	−0.196	+0.022	42.310	5 29 58.881	16.571	−0.018
	ζ Tauri . . .		7	4 46 48.257	−0.298	+0.040	−0.058	−0.209	+0.023	47.754	5 31 4.255	16.501	+0.052
	130 Tauri . . .	.	7	4 56 45.404	−0.295	+0.038	−0.039	−0.205	+0.033	44.936	5 41 1.410	16.474	+0.079
	α Orionis . . .	W.	7	5 4 56.960	−0.285	+0.023	+0.017	−0.196	+0.041	56.560	5 49 13.118	+0.44 16.558	−0.005

NORMAL EQUATIONS.

Assuming $a' = +0^s.381 + da'$ circle E. ; $a'' = +0.309 + da''$ " W. ; $c = +0.192 + dc$ " E. ; $\triangle T = +0^h 44^m 16^s.552 + dt$.

$$\left\{\begin{aligned} 0 &= -0.034 + 2.489\,da' \qquad\qquad - 2.323\,dc - 0.835\,dt \\ &\quad +0.063 \qquad\qquad + 2.986\,da'' + 2.267\,dc - 0.308\,dt \\ &\quad +0.358 - 2.323\,da' + 2.267\,da'' + 20.712\,dc - 0.732\,dt \\ &\quad +0.033 - 0.835\,da' - 0.308\,da'' - 0.732\,dc + 14.143\,dt \end{aligned}\right\}$$

whence $da' = -0^s.003$, $da'' = -0.009$, $dc = -0.017$, $dt = -0.004$

$a' = +0^s.378$ (circle east); $a'' = +0^s.300$ (circle west); $c = 0^s.175$ (+ with circle east).

Chronometer No. 1254, at $4^h\ 24^m.5$ chron. time, $0^h\ 44^m\ 16^s.553 \pm 0^s.013$ slow, losing $0^s.061$ per hour.

Transits of stars observed at La Guayra, Venezuela, by Lieut. Charles Laird, U. S. Navy, with transit No. 1504, to determine the correction of sidereal chronometer Negus No. 1254.

Date.	Name of Star.	Circle.	No. of threads.	Transit over mean of threads.	Flexure and inequality of pivots.	Level.	Azimuth.	Aberration and collimation.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
				h. m. s.	s.	s.	s.	s.	s.	s.	h. m. s.	h. m. s.	s.
1890. Feb. 11	μ Eridani . . .	E.	7	3 55 41.613	+0.275	−0.049	+0.004	+0.127	−0.039	41.931	4 39 59.918	+0 44 17.987	+ 0.162
	α Camelop.		7	3 58 48.190	+0.386	−0.065	−0.041	+0.314	−0.035	48.749	4 43 6.704	[17.955]	. .
	i Tauri . .	.	7	4 0 37.533	+0.296	−0.050	−0.003	+0.134	−0.033	37.877	4 44 56.118	18.241	− 0.092
	π Orionis . . .		7	4 4 12.503	+0.280	−0.046	+0.003	+0.127	−0.029	12.838	4 48 31.139	18.301	− 0.152
	10 Camelop. .	.	7	4 9 19.221	+0.369	−0.059	−0.031	+0.256	−0.026	19.730	4 53 38.010	[18.280]	.
	ι Tauri		7	4 12 12.529	+0.299	−0.046	−0.004	+0.136	−0.020	12.904	4 56 31.050	18.146	+ 0.003
	11 Orionis . . .	.	7	4 13 58.353	+0.292	−0.045	−0.002	+0.132	−0.018	58.712	4 58 16.826	18.114	+ 0.035
	λ Eridani . . .	E.	7	4 19 34.397	+0.270	−0.040	+0.007	+0.128	−0.012	34.750	5 3 52.894	+0 44 18.144	+ 0.005
	17 Camelop. . .	W.	7	4 35 30.514	−0.380	−0.020	−0.418	−0.367	+0.006	29.335	5 19 47.120	+0 44[17.785]	. . .
	Gr. 966 . .		7	4 40 45.610	−0.472	+0.010	−0.834	−0.644	+0.012	43.682	5 25 2.455	[18.783]	. . .
	δ Orionis . .		7	4 42 5.433	−0.278	+0.010	+0.046	−0.167	+0.013	5.057	5 26 23.250	18.193	− 0.044
	α Leporis . .		7	4 43 34.943	−0.261	+0.012	+0.120	−0.175	+0.015	34.654	5 27 52.888	18.234	− 0.085
	θ² Orionis . .		7	4 45 41.007	−0.273	+0.017	+0.067	−0.168	+0.018	40.668	5 29 58.871	18.203	− 0.054
	ζ Tauri		7	4 46 46.537	−0.298	+0.021	−0.047	−0.179	+0.019	46.053	5 31 4.242	18.189	− 0.040
	σ Orionis . .		7	4 48 55.659	−0.276	+0.022	+0.055	−0.167	+0.021	55.314	5 33 13.483	18.169	− 0.020
	130 Tauri . . .		7	4 56 43.780	−0.295	+0.031	−0.031	−0.175	+0.030	43.340	5 41 1.397	18.057	+ 0.092
	u Orionis . .	W.	7	5 4 55.519	−0.285	+0.024	+0.014	−0.168	+0.039	55.143	5 49 13.107	+0 44 17.964	+ 0.185

NORMAL EQUATIONS.

Assuming
$a' = -0^s.012 + da'$ circle E.
$a'' = +0.267 + da''$ " W.
$c = +0.138 + dc$ " E.
$\triangle T = +0^h\ 44^m\ 18^s.139 + dt.$

$$\left\{\begin{aligned} 0 &= -0.049 + 2.394\,da' - 2.386\,dc - 0.893\,dt \\ &+0.063 + 3.039\,da'' + 2.058\,dc - 0.099\,dt \\ &-0.056 - 2.386\,da' + 2.058\,da'' + 20.608\,dc - 0.756\,dt \\ &-0.047 - 0.893\,da' - 0.099\,da'' - 0.756\,dc + 14.143\,dt \end{aligned}\right\}$$

whence $da' = +0^s.032$, $da'' = -0.027$, $dc = +0.009$, $dt = +0.006$

$a' = +0^s.020$ (circle east); $a'' = +0^s.240$ (circle west); $c = 0^s.147$ (+ with circle east).

Chronometer No. 1254, at $4^h\ 30^m.1$ chron. time, $0^h\ 44^m\ 18^s.149 \pm 0^s.018$ slow, losing $0^s.068$ per hour.

LATITUDE OBSERVATIONS.

Latitude of observing station, Coatzacoalcos, from zenith telescope observations by Lieut. J. A. Norris.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Corrections. Level.	Corrections. Ref.	Latitude.	v.
1889.		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
Jan. 12	B. A. C. 1087 1095	+12 33 15.02 +24 5 26.60	+18 19 20.81	−10 33.51*	− 0.54	−0.21	+18 8 46.55	0.36
	1216 1219	− 3 17 10.14 +39 41 19.71	+18 12 4.78	− 3 24.88	+ 6.49	−0.07	+18 8 46.32	0.13
Jan. 14	1907 1938	+12 47 43.22 +23 16 3.03	+18 1 53.12	+ 6 53.62	− 1.83	+0.14	+18 8 45.05	1.14
	2144 2170	+ 7 39 23.96 +28 21 32.62	+18 0 28.29	+ 8 13.12	+ 4.43	+0.16	+18 8 46.00	0.19
Jan. 15	1216 1219	−3 17 10.38 +39 41 19.94	+18 12 4.78	− 3 5.93	−13.12	−0.06	+18 8 45.67	0.52
	1371 1393	+22 44 40.28 +13 28 50.03	+18 6 45.16	+ 2 2.42	− 1.60	+0.04	+18 8 46.02	0.17
	1403 1492	− 0 17 7.53 +36 30 54.06	+18 6 53.26	+ 2 11.92	−19.69	+0.04	+18 8 45.53	0.66
	1540 1552	+43 39 31.98 − 7 20 25.35	+18 9 33.32	− 0 48.57	+ 0.76	−0.02	+18 8 45.49	0.70
	1663 1682	+37 16 51.69 − 1 0 4.33	+18 8 23.68	+ 0 22.32	− 0.15	0.00	+18 8 45.85	0.34
	1692 1726	+17 51 53.72 +18 30 34.80	+18 11 14.26	− 2 26.81	− 0.61	−0.05	+18 8 46.79	0.60
	1692 1734	+17 51 53.72 +18 27 32.97	+18 9 43.34	− 0 55.87	− 0.46	−0.02	+18 8 46.99	0.80
	1780 1830	− 2 39 57.15 +39 8 32.38	+18 14 17.62	− 5 25.57	− 3.89	−0.11	+18 8 48.05	1.86
	1780 1845	− 2 39 57.15 +39 6 53.23	+18 13 28.04	− 4 36.87	− 3.97	−0.09	+18 8 47.11	0.92
	1907 1938	+12 47 43.18 +23 16 3.06	+18 1 53.12	+ 6 52.93	+ 0.08	+0.14	+18 8 46.27	0.08
	1907 1971	+12 47 43.18 +23 7 46.21	+17 57 44.70	+11 1.07	+ 0.23	+0.22	+18 8 46.22	0.03
	1986 2009	+19 48 47.12 +16 10 30.57	+17 59 38.84	+ 9 8.50	− 0.99	+0.18	+18 8 46.53	0.34
	2057 2110	+ 3 49 5.80 +32 31 58.90	+18 10 32.35	− 1 44.85	− 1.14	−0.03	+18 8 46.33	0.14
	2144 2170	+ 7 39 23.89 +28 21 32.68	+18 0 28.28	+ 8 19.52	0.00	+0.17	+18 8 47.97	1.78
Jan. 16	1087 1095	+12 33 14.96 +24 5 26.67	+18 19 20.82	−10 31.79	− 4.20	−0.21	+18 8 44.62	1.57
	1216 1219	− 3 17 10.43 +39 41 20.04	+18 12 4.80	−3 15.30	− 3.82	−0.07	+18 8 45.61	0.58
	1403 1492	− 0 17 7.58 +36 30 54.17	+18 6 53.30	+ 1 55.53	− 4.27	+0.04	+18 8 44.60	1.59
	1540 B. A. C. 1552	+43 39 31.87 − 7 20 25.43	+18 9 33.22	− 0 45.33	− 0.84	−0.01	+18 8 47.04	0.85

Latitude of observing station, Coatzacoalcos, from zenith telescope observations by Lieut. J. A. Norris—Continued.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections.			Latitude.	v.
				Micrometer.	Level.	Ref.		
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1889. Jan. 16	B. A. C. 1558	+41 5 2.25	+18 8 17.26	+0 26.66	+1.53	+0.01	+18 8 45.46	0.73
	1579	−4 48 27.73						
	1558	+41 5 2.25	+18 14 23.72	−5 39.77	+1.53	−0.11	+18 8 45.37	0.82
	1593	−4 36 14.82						
	1663	+37 16 51.81	+18 8 23.71	+0 20.74	+0.08	+0.01	+18 8 44.54	1.65
	1682	−1 0 4.39						
	1692	+17 51 53.75	+18 9 43.38	−0 59.18	+0.92	−0.02	+18 8 45.10	1.09
	1734	+18 27 33.00						
	1780	−2 39 57.22	+18 14 17.58	−5 30.33	+0.53	−0.11	+18 8 47.67	1.48
	1830	+39 8 32.38						
	1780	−2 39 57.22	+18 13 28.08	−4 41.49	+0.69	−0.09	+18 8 47.19	1.00
	1845	+39 6 53.37						
	1956	+19 48 47.16	+17 59 38.88	+9 4.02	+3.36	+0.18	+18 8 46.44	0.25
	2009	+16 10 30.59						
	2057	+3 49 5.74	+18 10 32.38	−1 46.23	+1.53	−0.04	+18 8 47.64	1.45
	2110	+32 31 59.01						
	2144	+7 39 23.85	+18 0 28.30	+8 16.35	+1.07	+0.17	+18 8 45.89	0.30
	B. A. C. 2170	+28 21 32.76						
	Mean (31 determinations)						+18 8 46.19	±0.12

Latitude of observing station, Salina Cruz, from zenith telescope observations by Lieut. J. A. Norris.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections.			Latitude.	v.
				Micrometer.	Level.	Ref.		
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1889. Feb. 18.	B. A. C. 2022	+9 58 49.19	+16 16 28.78	−6 21.24	−0.08	−0.12	+16 10 7.34	0.60
	2047	+22 34 8.37						
	2088	−0 12 43.75	+16 9 38.93	+0 29.48	−0.84	+0.01	+16 10 7.58	0.84
	2110	+32 32 1.61						
	2211	+8 42 8.52	+16 13 3.36	−2 51.60	−2.52	−0.06	+16 10 9.18	2.44
	2238	+23 43 58.20						
	2304	+9 17 51.68	+16 2 59.46	+7 3.67	+4.58	+0.14	+16 10 7.85	1.11
	2313	+22 48 7.25						
	2330	+16 6 21.17	+16 13 31.92	−3 23.85	−2.37	−0.07	+16 10 5.63	1.11
	2362	+16 20 42.68						
	2423	+20 39 5.03	+16 16 5.86	−6 2.36	+2.06	−0.12	+16 10 5.44	1.30
	2444	+11 53 6.70						
Feb. 19.	1665	+3 26 5.05	+15 58 25.16	+11 38.55	+5.49	+0.23	+16 10 9.43	2.69
	1681	+28 30 45.26						
	1828	+17 41 8.17	+15 58 42.42	+11 25.78	−0.31	+0.23	+16 10 8.12	1.38
	1852	+14 16 16.66						
	1880	+19 43 34.04	+16 15 38.32	−5 34.46	+0.23	−0.11	+16 10 3.98	2.76
	B. A. C. 1907	+12 47 42.59						

Latitude of observing station, Salina Cruz, from zenith telescope observations by Lieut. J. A. Norris—Continued.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Level.	Ref.	Latitude.	v.
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1889. Feb. 19	B. A. C. 1934 2012	+19 41 25.91 +12 35 0.63	+16 8 13.27	+ 1 51.05	+ 0.15	+0.04	+16 10 4.51	2.23
	1986 2012	+19 48 50.99 +12 35 0.63	+16 11 55.81	− 1 51.40	+ 1.07	−0.03	+16 10 5.45	1.29
	2022 2047	+ 9 58 49.15 +22 34 8.40	+16 16 28.78	− 6 17.31	− 3.66	−0.13	+16 10 7.68	0.94
	2304 2313	+ 9 17 51.64 +22 48 7.27	+16 2 59.46	+ 7 10.43	− 1.22	+0.14	+16 10 8.81	2.07
	2330 2362	+16 6 21.09 +16 20 42.67	+16 13 31.88	− 3 27.43	+ 0.76	−0.07	+16 10 5.14	1.60
	2423 2444	+20 39 5.04 +11 53 6.68	+16 16 5.86	− 5 55.75	− 0.92	−0.12	+16 10 9.07	2.33
	2493 2522	+27 8 27.37 + 5 30 24.49	+16 19 25.93	− 9 20.01	− 0.61	−0.19	+16 10 5.12	1.62
Feb. 20	1689 1701	+16 35 56.98 +15 46 40.76	+16 11 18.87	− 1 9.65	− 0.84	−0.02	+16 10 8.36	1.62
	1725 1772	+ 3 12 16.41 +29 9 3.59	+16 10 40.00	− 0 31.76	− 1.15	−0.01	+16 10 7.08	0.34
	1792 1810	+16 28 27.36 +16 2 8.40	+16 15 17.88	− 5 15.18	+ 2.59	−0.11	+16 10 5.18	1.56
	1880 1907	+19 43 34.01 +12 47 42.54	+16 15 38.28	− 5 32.46	+ 0.38	−0.11	+16 10 6.09	0.65
	1934 2012	+19 41 25.88 +12 35 0.59	+16 8 13.24	+ 1 52.02	0.00	+0.04	+16 10 5.30	1.44
	1986 2012	+19 48 47.61 +12 35 0.59	+16 11 54.10	− 1 48.09	+ 0.15	−0.04	+16 10 6.12	0.62
	2022 2047	+ 9 58 49.10 +22 34 8.42	+16 16 28.76	− 6 24.48	− 0.15	−0.13	+16 10 4.00	2.74
	2304 2313	+ 9 17 51.59 +22 48 7.27	+16 2 59.43	+ 7 10.36	− 0.92	+0.14	+16 10 9.01	2.27
	2330 2362	+16 6 21.07 +16 20 42.65	+16 13 31.86	− 3 26.05	+ 1.45	−0.07	+16 10 7.19	0.45
	2423 2444	+20 39 5.04 +11 53 6.64	+16 16 5.84	− 5 58.44	+ 0.23	−0.12	+16 10 7.51	0.77
	2493 2522	+27 8 27.39 + 5 30 24.42	+16 19 25.90	− 9 20.14	− 0.31	−0.19	+16 10 5.26	1.48
	2493 B. A. C. 2526	+27 8 27.39 + 5 29 3.05	+16 18 45.22	− 8 37.38	− 0.31	−0.17	+16 10 7.36	0.62
	Mean (28 determinations)						+16 10 6.74	±0.22

Latitude of observing station, San Juan del Sur, from zenith telescope observations by Lieut. J. A. Norris.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Corrections. Level.	Corrections. Ref.	Latitude.	v.
		° ′ ″	° ′ ″	′ ″	′	′	° ′ ″	′
1889. Mar. 31	B. A. C. 3769 3838	+ 6 41 45.64 +16 2 6.20	+11 21 55.92	− 6 56.30	+ 5.49	−0.14	+11 15 4.97	0.66
	3838 3862	+16 2 6.20 + 6 38 9.30	+11 20 7.75	− 5 6.35	+ 5.49	−0.09	+11 15 6.80	1.17
Apr. 1	3398 3406	+ 9 27 25.85 +12 58 21.58	+11 12 53.72	+ 2 11.37	− 0.53	+0.04	+11 15 4.60	1.03
	3663 3671	− 1 9 37.00 +23 46 7.38	+11 18 15.19	− 3 9.86	− 0.84	−0.06	+11 15 4.43	1.20
	3684 3691	+ 3 4 11.18 +19 28 29.31	+11 16 20.24	− 1 13.78	− 2.21	−0.03	+11 15 4.22	1.41
	3711 3735	− 3 26 20.35 +26 4 52.15	+11 19 15.90	− 4 8.42	+ 0.08	−0.08	+11 15 7.48	1.85
	3711 3751	− 3 26 20.35 +26 5 31.86	+11 19 35.76	− 4 28.95	+ 0.08	−0.09	+11 15 6.80	1.17
	3769 3838	+ 6 41 45.69 +16 2 6.29	+11 21 55.99	− 6 52.03	+ 2.52	−0.14	+11 15 6.34	0.71
	3838 3862	+16 2 6.29 + 6 38 9.34	+11 20 7.82	− 5 3.32	+ 0.08	−0.10	+11 15 4.48	1.15
Apr. 2	3398 3406	+ 9 27 25.41 +12 58 21.63	+11 12 53.52	+ 2 10.75	+ 0.53	+0.04	+11 15 4.84	0.79
	3415 3475	+ 8 34 29.68 +13 54 6.08	+11 14 17.88	+ 0 46.63	+ 1.22	+0.02	+11 15 5.75	0.12
	3534 3544	+15 32 1.64 + 7 6 14.94	+11 19 8.29	− 4 3.66	+ 0.53	−0.08	+11 15 5.08	0.55
	3663 3671	− 1 9 37.00 +23 46 7.49	+11 18 15.24	− 3 17.04	+ 7.71	−0.07	+11 15 5.84	0.21
	3684 3691	+ 3 4 11.20 +19 28 29.41	+11 16 20.30	− 1 14.19	− 1.83	−0.03	+11 15 4.25	1.38
	3711 3735	− 3 26 20.37 +26 4 52.28	+11 19 15.96	− 4 11.04	+ 0.23	−0.08	+11 15 5.07	0.56
	3711 3751	− 3 26 20.37 +26 5 31.99	+11 19 35.81	− 4 30.12	+ 0.23	−0.09	+11 15 5.83	0.20
	3769 3838	+ 6 41 45.72 +16 2 6.38	+11 21 56.05	− 7 13.18	+25.71	−0.14	+11 15 8.44	2.81
	3838 3862	+16 2 6.38 + 6 38 9.38	+11 20 7.88	− 5 29.09	+28.38	−0.11	+11 15 7.06	1.43
	3956 3965	−12 35 36.47 +34 49 41.92	+11 7 2.72	+ 8 1.27	0.00	+0.16	+11 15 4.15	1.48
	3982 B. A. C. 3995	+ 7 8 59.55 +15 11 28.52	+11 10 14.04	+ 4 51.96	− 0.08	+0.10	+11 15 6.02	0.39
	Mean (20 determinations)						+11 15 5.63	±0.19

Latitude of observing station, St. Nicolas Mole, from zenith telescope observations by Lieut. J. A. Norris.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections.			Latitude.	*v.*
				Micrometer.	Level.	Ref.		
1889.		° ′ ″	° ′ ″	° ″	″	″	° ′ ″	″
Dec. 10	B. A. C. 8237 8328	+43 43 37.51 − 4 10 5.95	+19 46 45.78	+ 2 28.11	− 0.08	+0.05	+19 49 13.86	1.10
	8350 8370	+26 30 2.04 +12 47 0.61	+19 38 31.33	+10 40.40	+ 1.75	+0.16	+19 49 13.64	1.32
	100 145	+43 47 15.77 − 4 12 2.94	+19 47 36.42	+ 1 37.55	+ 0.15	+0.03	+19 49 14.15	0.81
	469 556	+17 53 53.08 +21 43 44.84	+19 48 48.96	+ 0 25.14	+ 0.92	+0.01	+19 49 15.03	0.07
	625 649	+ 2 13 50.09 +37 20 17.09	+19 47 3.59	+ 2 11.37	+ 0.76	+0.04	+19 49 15.76	0.80
Dec. 11	8203 8227	+21 53 31.02 +17 47 27.50	+19 50 29.26	− 1 14.06	+ 0.31	−0.02	+19 49 15.49	0.53
	8237 8328	+43 43 37.51 − 4 10 6.02	+19 46 45.75	+ 2 28.04	+ 2.06	+0.04	+19 49 15.89	0.93
	8350 8370	+26 30 2.02 +12 47 0.56	+19 38 31.29	+10 44.74	− 1.75	+0.16	+19 49 14.44	0.52
	170 214	+20 50 5.68 +18 58 38.31	+19 54 22.00	− 5 6.56	+ 0.08	−0.08	+19 49 15.44	0.48
	223 250	+16 20 46.51 +23 1 57.18	+19 41 21.85	+ 7 51.69	− 0.08	+0.12	+19 49 13.58	1.38
	307 336	+20 53 2.54 +19 4 16.91	+19 58 39.73	− 9 26.96	+ 2.67	−0.14	+19 49 15.30	0.34
	384 425	− 3 4 52.53 +42 53 18.59	+19 54 13.03	− 4 54.50	− 1.76	−0.09	+19 49 16.68	1.72
	469 556	+17 53 53.09 +21 43 44.86	+19 48 48.98	+ 0 26.80	− 0.76	0.00	+19 49 15.02	0.06
	580 615	+36 42 46.55 + 2 34 8.81	+19 38 27.68	+10 48.05	+ 1.60	+0.19	+19 49 17.52	2.56
	625 649	+ 2 13 50.04 +37 20 17.20	+19 47 3.62	+ 2 14.89	− 2.21	+0.04	+19 49 16.34	1.38
	675 745	+29 47 16.20 +10 6 38.62	+19 56 57.41	− 7 44.32	+ 0.92	−0.12	+19 49 13.89	1.07
	675 755	+29 47 16.20 +10 4 8.21	+19 55 42.20	− 6 29.23	+ 0.99	−0.09	+19 49 13.87	1.09
Dec. 12	625 649	+ 2 13 49.98 +37 20 17.29	+19 47 3.64	+ 2 13.09	− 1.37	+0.04	+19 49 15.40	0.44
Dec. 13	307 336	+20 53 2.49 +19 4 16.85	+19 58 39.67	− 9 26.28	+ 2.06	−0.14	+19 49 15.31	0.35
	384 425	− 3 4 52.70 +42 53 18.75	+19 54 13.03	− 4 57.95	+ 1.98	−0.09	+19 49 16.97	2.01
	469 556	+17 53 53.03 +21 43 44.86	+19 48 48.95	+ 0 25.56	− 0.99	+0.01	+19 49 13.53	1.43
	580 B. A. C. 615	+36 42 46.67 + 2 34 8.66	+19 38 27.67	+10 40.08	+ 3.97	+0.18	+19 49 12.50	2.46

Latitude of observing station, St. Nicolas Mole, from zenith telescope observations by Lieut. J. A. Norris—Continued.

Date.	Number and Catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Corrections. Level.	Corrections. Ref.	Latitude.	v.
1889.		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
Dec. 13	B. A. C. 675	+29 47 16.29	+19 56 57.42	− 7 41.15	− 1.22	−0.12	+19 49 14.93	0.03
	745	+10 6 38.55						
	675	+29 47 16.29	+19 55 42.21	− 6 25.10	− 1.22	−0.10	+19 49 15.79	0.83
	755	+10 4 8.13						
	808	+21 29 6.84	+19 39 17.94	+ 9 54.31	+ 0.76	+0.15	+19 49 13.16	1.80
	867	+17 49 29.04						
Dec. 14	170	+20 50 5.54	+19 54 21.85	− 5 8.76	+ 1.37	−0.08	+19 49 14.38	0.58
	214	+18 58 38.16						
	223	+16 20 46.34	+19 41 21.71	+ 7 50.38	+ 1.22	+0.12	+19 49 13.43	1.53
	250	+23 1 57.08						
	307	+20 53 2.44	+19 58 39.62	− 9 25.24	+ 1.14	−0.14	+19 49 15.38	0.42
	336	+19 4 16.80						
	580	+36 42 46.72	+19 38 27.65	+10 46.60	− 0.08	+0.18	+19 49 14.35	0.61
	615	+ 2 34 8.57						
	625	+ 2 13 49.80	+19 47 3.60	+ 2 8.76	+ 0.30	+0.04	+19 49 12.70	2.26
	649	+37 20 17.40						
	675	+29 47 16.31	+19 56 57.40	− 7 45.14	+ 1.98	−0.12	+19 49 14.12	0.84
	745	+10 6 38.49						
	675	+29 47 16.31	+19 55 42.19	− 6 29.30	+ 1.98	−0.10	+19 49 14.77	0.19
	755	+10 4 8.07						
	808	+21 29 6.83	+19 39 17.93	+10 0.38	− 2.75	+0.15	+19 49 15.71	0.75
	867	+17 49 29.02						
	904	+31 29 29.18	+19 58 46.88	− 9 32.54	+ 0.76	−0.15	+19 48 14.95	0.01
	929	+ 8 28 4.57						
	986	+19 18 35.41	+19 58 22.58	− 9 7.54	− 0.23	−0.14	+19 49 14.67	0.29
	999	+20 38 9.74						
Dec. 15	307	+20 53 2.37	+19 58 39.56	− 9 26.62	+ 1.60	−0.14	+19 49 14.40	0.56
	336	+19 4 16.75						
	469	+17 53 52.94	+19 48 48.87	+ 0 29.28	− 2.29	+0.01	+19 49 15.87	0.91
	556	+21 43 44.80						
Dec. 16	904	+31 29 29.24	+19 58 46.83	− 9 32.13	+ 0.38	−0.15	+19 49 14.93	0.03
	929	+ 8 28 4.41						
	986	+19 18 35.36	+19 58 22.53	− 9 5.54	− 0.61	−0.13	+19 49 16.25	1.29
	999	+20 38 9.70						
	1040	+27 12 46.61	+19 53 8.69	− 3 52.09	0.00	−0.05	+19 49 16.55	1.59
	1087	+12 33 30.76						
	1132	+33 36 43.33	+19 54 26.97	− 5 11.38	+ 1.45	−0.08	+19 49 16.96	2.00
	1202	+ 6 12 10.61						
	1285	+ 5 14 6.10	+19 46 3.98	+ 3 10.89	− 0.76	+0.05	+19 49 14.16	0.80
	1322	+34 18 1.85						
	1346	+17 17 0.57	+19 55 24.09	− 6 7.18	− 3.05	−0.09	+19 49 13.77	1.19
	1367	+22 33 47.60						
	1356	+17 11 17.02	+19 52 32 31	− 3 15.65	− 3.05	−0.05	+19 49 13.56	1.40
	B. A. C. 1367	+22 33 47.60						

Latitude of observing station, St. Nicolas Mole, from zenith telescope observations by Lieut. J. A. Norris—Continued.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Level.	Ref.	Latitude.	v.
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1889. Dec. 16	B. A. C. 1429	− 3 34 44.03	+19 47 17.30	+ 1 59.94	− 0.92	+0.04	+19 49 16.36	1.40
	1445	+43 9 18.63						
	1476	+37 17 38.43	+19 48 34.85	+ 0 41.68	− 0.15	+0.01	+19 49 16.39	1.43
	1508	+ 2 19 31.27						
	1476	+37 17 38.43	+19 46 35.74	+ 2 39.82	− 0.15	+0.05	+19 49 15.46	0.50
	1514	+ 2 15 33.04						
Dec. 17	675	+29 47 16.33	+19 56 57.30	− 7 44.46	+ 2.29	−0.12	+19 49 15.01	0.05
	745	+10 6 38.26						
	675	+29 47 16.33	+19 55 42.08	− 6 29.09	+ 2.21	−0.10	+19 49 15.10	0.14
	755	+10 4 7.82						
	808	+21 29 6.76	+19 39 17.84	+ 9 54.86	+ 1.07	+0.15	+19 49 13.92	1.04
	867	+17 49 28.91						
	904	+31 29 29.27	+19 58 46.80	− 9 30.41	0.00	−0.15	+19 49 16.24	1.28
	929	+ 8 28 4.33						
	986	+19 18 35.33	+19 58 22.50	− 9 6.44	− 0.69	−0.14	+19 49 15.23	0.27
	B. A. C. 999	+20 38 9.67						
	Mean (52 determinations)						+19 49 14.96	±0.11

Latitude of observing station, Port Plata, from zenith telescope observations by Lieut. Charles Laird.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Level.	Ref.	Latitude.	v.
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1889. Dec. 26	B. A. C. 1285	+ 5 14 5.43	+19 46 4.12	+ 2 42.23	0.00	+0.04	+19 48 46.39	0.24
	1322	+34 18 2.80						
	1356	+17 11 16.99	+19 52 32.43	− 3 53.81	+ 4.73	−0.06	+19 48 43.29	2.86
	1367	+22 33 47.87						
	1429	− 3 34 45.24	+19 47 17.42	+ 1 23.30	+ 6.08	+0.02	+19 48 46.82	0.67
	1445	+43 9 20.09						
	1476	+37 17 39.55	+19 48 34.94	+ 0 9.36	+ 1.22	0.00	+19 48 45.52	0.63
	1508	+ 2 19 30.32						
	1476	+37 17 39.55	+19 46 35.82	+ 2 9.08	+ 1.22	+0.04	+19 48 46.16	0.01
	1514	+ 2 15 32.08						
	1631	+40 0 1.27	+19 44 11.24	+ 4 24.05	+11.15	+0.08	+19 48 46.52	0.37
	1657	− 0 31 38.80						
	1631	+40 0 1.27	+19 45 13.66	+ 3 21.56	+11.15	+0.06	+19 48 46.43	0.28
	1660	− 0 29 33.96						
	1701	+15 46 47.95	+19 52 21.59	− 3 1.03	−32.09	−0.04	+19 48 48.43	2.28
	1742	+23 57 55.23						
	1766	+ 9 13 47.24	+19 49 40.99	− 0 46.68	− 6.76	−0.01	+19 48 47.54	1.39
	1768	+30 25 34.74						
	1880	+19 43 37.85	+19 56 0.92	− 7 10.17	− 4.05	−0.10	+19 48 46.60	0.45
	B. A. C. 1939	+20 8 23.99						

Latitude of observing station, Port Plata, from zenith telescope observations by Lieut. Charles Laird—Continued.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Corrections. Level.	Corrections. Ref.	Latitude.	v.
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1889. Dec. 27	B. A. C. 469	+17 53 52.71	+19 48 48.74	− 0 12.83	+10.47	0.00	+19 48 46.38	0.23
	556	+21 43 44.78						
	580	+36 42 47.38	+19 38 27.56	+10 9.74	+ 9.12	+0.17	+19 48 46.59	0.44
	615	+ 2 34 7.73						
	625	+ 2 13 48.97	+19 47 3.58	+ 1 48.06	− 7.09	+0.03	+19 48 44.58	1.57
	649	+37 20 18.18						
	986	+19 18 35.46	+19 58 22.67	− 9 22.51	−15.54	−0.14	+19 48 44.48	1.67
	999	+20 38 9.88						
	1040	+27 12 47.15	+19 53 8.83	− 4 8.72	−12.83	−0.06	+19 48 47.22	1.07
	1087	+12 33 30.51						
	1132	+33 36 44.28	+19 54 27.14	− 5 35.70	− 6.08	−0.09	+19 48 45.27	0.88
	1202	+ 6 12 9.99						
	1223	+22 51 19.12	+19 57 0.24	− 7 59.76	−13.51	−0.12	+19 48 46.85	0.70
	1272	+17 2 41.36						
	1285	+ 5 14 5.37	+19 46 4.14	+ 2 47.71	− 8.11	+0.05	+19 48 43.79	2.36
	1322	+34 18 2.90						
	1429	− 3 34 45.35	+19 47 17.44	+ 1 23.86	+ 5.40	+0.02	+19 48 46.72	0.57
	1445	+43 9 20.24						
	1476	+37 17 39.67	+19 48 34.96	+ 0 2.08	+10.13	0.00	+19 48 47.17	1.02
	1508	+ 2 19 30.24						
	1476	+37 17 39.67	+19 46 35.84	+ 2 0.34	+10.13	+0.04	+19 48 46.35	0.20
	B. A. C. 1514	+ 2 15 32.00						
	Mean (21 determinations)						+19 48 46.15	±0.19

Latitude of observing station, Santo Domingo City, from zenith telescope observations by Lieut. J. A. Norris.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Corrections. Level.	Corrections. Ref.	Latitude.	v.
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1890. Jan. 7	B. A. C. 1332	+14 49 49.66	+18 26 9.28	+ 1 58.42	0.99	+0.03	+18 28 6.74	1.64
	1362	+22 2 28.90						
	1449	+22 44 42.10	+18 24 19.90	+ 3 39.90	+ 4.20	+0.05	+18 28 4.05	1.05
	1500	+14 3 57.69						
	1551	+21 25 54.88	+18 20 26.83	+ 7 34.67	+ 2.14	+0.11	+18 28 3.75	1.35
	1557	+15 14 58.77						
	1571	+21 33 29.71	+18 30 25.00	− 2 21.84	+ 1.30	−0.04	+18 28 4.42	0.68
	1591	+15 27 20.30						
	1611	+ 2 43 42.49	+18 17 7.71	+11 1.07	− 3.43	+0.17	+18 28 5.52	0.42
	1636	+33 50 32.93						
	1656	+ 8 19 4.78	+18 24 57.31	+ 3 12.06	− 3.05	+0.05	+18 28 6.37	1.27
	1681	+28 30 49.84						
	1701	+15 46 47.60	+18 25 37.79	+ 2 29.22	− 1.45	+0.04	+18 28 5.60	0.50
	B. A. C. 1767	+21 4 27.98						

Latitude of observing station, Santo Domingo City, from zenith telescope observations by Lieut. J. A. Norris—Continued.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Level.	Ref.	Latitude.	*v*.
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1890. Jan. 7	B. A. C. 1767 1810	+21 4 27.98 +16 2 13.71	+18 23 20.85	− 5 13.17	− 1.83	−0.08	+18 28 5.77	0.67
	1767 1821	+21 4 27.98 +15 46 41.10	+18 25 34.54	+ 2 32.04	− 1.83	+0.04	+18 28 4.79	0.31
	1837 1846	+24 31 47.10 +12 36 55.86	+18 34 21.48	− 6 20.20	+ 4.20	−0.09	+18 28 5.38	0.28
	1863 1928	+27 35 7.77 + 9 38 46.03	+18 36 56.90	− 8 52.11	+ 0.76	−0.14	+18 28 5.41	0.31
Jan. 8	1087 1095	+12 33 30.03 +24 5 41.19	+18 19 35.61	+ 8 29.58	− 0.30	+0.13	+18 28 5.02	0.08
	1134 1139	− 5 34 6.64 +42 13 53.97	+18 19 53.67	+ 8 15.18	− 2.06	+0.14	+18 28 6.93	1.83
	1162 1207	+ 5 42 12.78 +31 33 24.40	+18 37 48.59	− 9 39.50	− 2.75	−0.15	+18 28 6.19	1.09
	1257 1302	+21 46 49.34 +15 7 27.09	+18 27 8.22	+ 0 56.83	+ 0.68	+0.02	+18 28 5.75	0.65
	1257 1328	+21 46 49.34 +15 21 38.98	+18 34 14.16	− 6 9.11	+ 1.37	−0.09	+18 28 6.33	1.23
	1260 1302	+21 42 41.25 +15 7 27.09	+18 25 4.17	+ 3 0.28	+ 0.69	+0.04	+18 28 5.18	0.08
	1260 1328	+21 42 41.25 +15 21 38.98	+18 32 10.12	− 4 5.66	+ 1.37	−0.06	+18 28 5.77	0.67
	1332 1362	+14 49 49.66 +22 2 28.94	+18 26 9.30	+ 1 54.50	+ 0.76	+0.03	+18 28 4.59	0.51
	1449 1500	+22 44 42.15 +14 3 57.69	+18 24 19.92	+ 3 44.10	+ 0.15	+0.06	+18 28 4.23	0.87
	1551 1557	+21 25 54.93 +15 14 58.79	+18 20 26.86	+ 7 41.15	− 3.59	+0.11	+18 28 4.53	0.57
	1571 1591	+21 33 29.76 +15 27 20.31	+18 30 25.04	− 2 19.09	− 0.84	−0.03	+18 28 5.08	0.02
	1611 1636	+ 2 43 42.44 +33 50 33.05	+18 17 7.75	+10 56.25	− 0.84	+0.18	+18 28 3.34	1.76
	1656 1681	+ 8 19 4.75 +28 30 49.93	+18 24 57.34	+ 3 6.42	+ 0.38	+0.05	+18 28 4.19	0.91
	1701 1767	+15 46 47.62 +21 4 28.02	+18 25 37.82	+ 2 29.22	− 1.76	+0.04	+18 28 5.32	0.22
	1767 1810	+21 4 28.02 +16 2 13.73	+18 33 20.88	− 5 17.58	+ 0.46	−0.08	+18 28 3.68	1.42
	1767 1821	+21 4 28.02 +15 46 41.12	+18 25 34.57	+ 2 29.28	+ 0.46	+0.04	+18 28 4.35	0.75
	1837 1846	+24 31 47.17 +12 36 55.85	+18 34 21.51	− 6 22.00	+ 7.55	−0.10	+18 28 6.96	1.86
	1863 B. A. C. 1928	+27 35 7.85 + 9 38 46.00	+18 36 56.93	− 8 49.63	− 0.69	−0.14	+18 28 6.47	1.37

Latitude of observing station, Santo Domingo City, from zenith telescope observations by Lieut. J. A. Norris—Continued.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Corrections. Level.	Corrections. Ref.	Latitude.	v.
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1890. Jan. 9	B. A. C. 966 986	+17 27 16. 33 +19 18 35. 27	+18 22 55. 80	+ 5 10. 00	— 0. 69	+0. 08	+18 28 5. 19	0. 09
	994 1008	— 1 36 37. 41 +38 52 48. 06	+18 38 5. 33	— 9 59. 48	— 0. 30	—0. 17	+18 28 5. 38	0. 28
	1017 1041	+33 49 9. 35 + 3 16 37. 88	+18 32 53. 62	— 4 50. 37	0. 00	—0. 08	+18 28 3. 17	1. 93
	1052 1087	+24 20 2. 04 +12 33 30. 00	+18 26 46. 02	+ 1 18. 88	+ 0. 08	+0. 02	+18 28 5. 00	0. 10
	1087 1095	+12 33 30. 00 +24 5 41. 20	+18 19 35. 60	+ 8 27. 72	+ 0. 46	+0. 13	+18 28 3. 91	1. 19
	1134 1139	— 5 34 6. 72 +42 13 54. 07	+18 19 53. 68	+ 8 10. 57	+ 0. 84	+0. 15	+18 28 5. 24	0. 14
	1162 1207	+ 5 42 12. 73 +31 33 24. 46	+18 37 48. 60	— 9 44. 32	+ 1. 60	—0. 15	+18 28 5. 73	0. 63
	1257 1302	+21 46 49. 36 +15 7 27. 09	+18 27 8. 23	+ 0 58. 76	— 1. 83	+0. 01	+18 28 5. 17	0. 07
	1257 1328	+21 46 49. 36 +15 21 38. 98	+18 34 14. 17	— 6 5. 88	— 1. 68	—0. 09	+18 28 6. 52	1. 42
	1260 1302	+21 42 41. 27 +15 7 27. 09	+18 25 4. 18	+ 3 2. 76	— 1. 83	+0. 05	+18 28 5. 16	0. 06
	1260 1328	+21 42 41. 27 +15 21 38. 98	+18 32 10. 13	— 4 1. 87	— 1. 68	—0. 06	+18 28 6. 52	1. 42
	1449 1500	+22 44 42. 18 +14 3 57. 69	+18 24 19. 94	+ 3 43. 48	+ 0. 30	+0. 06	+18 28 3. 78	1. 32
	1551 1557	+21 25 54. 96 +15 14 58 79	+18 20 26. 87	+ 7 29. 44	+ 8. 24	+0. 11	+18 28 4. 66	0. 44
	1571 1591	+21 33 29. 80 +15 27 20. 32	+18 30 25. 06	— 2 20. 40	+ 0. 08	—0. 03	+18 28 4. 71	0. 39
	1611 1636	+ 2 43 42. 38 +33 50 33. 15	+18 17 7. 77	+10 53. 35	+ 1. 98	+0. 18	+18 28 3. 28	1. 82
	1656 B. A. C. 1681	+ 8 19 4. 72 +28 30 50. 01	+18 24 57. 37	+ 3 6. 55	+ 0. 23	+0. 05	+18 28 4. 20	0. 90
	Mean (45 determinations)						+18 28 5. 10	±0. 10

Latitude of observing station, Curaçao, from zenith telescope observations by Lieut. Charles Laird.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections.			Latitude.	v.
				Micrometer.	Level.	Ref.		
1890.		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
Jan. 26	B. A. C. 1304	+ 8 36 54.42	+12 9 6.26	— 2 49.66	+ 2.92	—0.04	+12 6 19.48	2.44
	1366	+15 41 18.11						
	1485	+15 42 40.27	+12 12 37.42	— 6 3.31	—12.65	—0.09	+12 6 21.37	0.55
	1491	+ 8 42 34.58						
	1722	+ 5 51 45.76	+12 9 42.34	—3 20.66	0.00	—0.05	+12 6 21.03	0.29
	1734	+18 27 38.92						
	1759	— 4 54 46.81	+12 7 12.34	— 0 38.70	—12.37	—0.01	+12 6 21.26	0.66
	1772	+29 9 11.48						
Jan. 27	1304	+ 8 36 54.34	+12 9 6.20	— 2 58.95	+15.00	—0.04	+12 6 22.21	0.29
	1366	+15 41 18.05						
	1434	+12 17 19.34	+12 8 4.25	— 1 28.02	—12.37	—0.02	+12 6 23.84	1.92
	1442	+11 58 49.16						
	1500	+14 3 57.19	+12 1 11.65	+ 5 8.72	0.00	+0.08	+12 6 20.45	1.47
	1516	+ 9 58 26.11						
	1551	+21 25 55.07	+12 4 48.02	+ 1 40.85	— 6.13	+0.03	+12 6 22.77	0.65
	1611	+ 2 43 40.98						
	1571	+21 33 29.93	+12 8 35.46	— 2 6.37	— 6.13	—0.03	+12 6 22.93	1.01
	1611	+ 2 43 40.98						
	1986	+19 48 49.86	+12 13 49.37	— 7 21.12	— 7.38	—0.11	+12 6 20.76	1.16
	2059	+ 4 38 48.88						
	2126	+ 7 24 43.72	+11 57 7.46	+ 9 16.54	— 0.40	+0.14	+12 6 23.74	1.82
	2163	+16 29 31.19						
Jan. 28	1500	+14 3 57.13	+12 1 11.59	+ 5 5.12	+ 2.29	+0.07	+12 6 19.07	2.85
	1516	+ 9 58 26.04						
	1908	+ 1 49 26.23	+12 6 37.29	— 0 19.07	+ 4.81	—0.01	+12 6 23.02	1.10
	1925	+22 23 48.35						
	1908	+ 1 49 26.23	+12 0 58.01	+ 5 21.41	+ 4.81	+0.08	+12 6 24.31	2.39
	B. A. C. 1970	+22 12 29.79						
	Mean (14 determinations)						+12 6 21.92	±0.29

Latitude of observing station La Guayra, from zenith telescope observations by Lieut. Charles Laird.

Date.	Number and catalogue.	Apparent declination.	Half sum of declinations.	Corrections. Micrometer.	Corrections. Level.	Corrections. Ref.	Latitude.	v.
		° ′ ″	° ′ ″	′ ″	″	″	° ′ ″	″
1890. Feb. 8	B. A. C. 1908	+1 49 25.60	+10 45 27.36	−8 34.65	+0.29	−0.13	+10 36 52.87	0.82
	1934	+19 41 29.11						
	2123	+4 55 57.49	+10 36 41.27	+0 8.05	+3.95	0.00	+10 26 53.27	0.42
	2140	+16 17 25.04						
	2123	+4 55 57.49	+10 42 44.36	−5 55.19	+3.95	−0.08	+10 36 53.04	0.65
	2163	+16 29 31.22						
	2123	+4 55 57.49	+10 42 56.86	−6 6.91	+3.95	−0.09	+10 36 53.81	0.12
	2184	+16 29 56.24						
	2123	+4 55 57.49	+10 37 47.56	−0 57.29	+3.95	−0.01	+10 36 54.21	0.52
	2228	+16 19 37.64						
Feb. 11	1944	+5 25 26.25	+10 47 20.62	−10 29.23	−0.57	−0.16	+10 36 50.66	3.03
	1989	+16 9 14.99						
	1944	+5 25 26.25	+10 44 43.50	−7 51.79	−0.57	−0.12	+10 36 51.02	2.67
	2005	+16 4 0.75						
	1944	+5 25 26.25	+10 47 59.46	−11 4.68	−0.57	−0.17	+10 36 54.04	0.35
	2009	+16 10 32.68						
Feb. 12	1370	+14 27 48.94	+10 36 54.78	+0 2.15	−2.29	0.00	+10 36 54.64	0.95
	1486	+6 46 0.62						
	1409	+14 36 40.83	+10 41 20.72	−4 23.64	−2.29	−0.06	+10 36 54.73	1.04
	1486	+6 46 0.62						
	1493	+18 39 5.18	+10 27 16.86	+9 38.88	−3.95	+0.15	+10 36 51.94	1.75
	1514	+2 15 28.53						
	1647	+19 27 52.23	+10 36 13.04	+0 42.38	−1.14	+0.01	+10 36 54.29	0.60
	1685	+1 44 33.84						
	1651	+19 42 8.31	+10 43 21.08	−6 23.08	−1.14	−0.10	+10 36 56.76	3.07
	1685	+1 44 33.84						
	1834	+13 51 29.88	+10 37 17.22	−0 19.84	−0.97	−0.01	+10 36 56.40	2.71
	B. A. C. 1883	+7 23 4.56						
	Mean (14 determinations)						10 36 53.69	±0.32

RESULTS.

RESULTS.

The results of the foregoing observations are given as follows:

The first two tables show the final clock corrections deduced from the observations made by Lieut. J. A. Norris and Lieut. Charles Laird.

The third table shows the difference of the chronometer faces on each night as deduced from the exchange of time signals.

The fourth table gives the differences of longitude between the various stations on each night on which time signals were exchanged and observations made. The data for this table are taken from the preceding tables of clock corrections and chronometer comparisons. The last column in this table shows the wave and armature time, $\omega = \frac{1}{2}(\lambda' - \lambda'')$. In the measurements between Vera Cruz and Coatzacoalcos, and Coatzacoalcos and Salina Cruz, which were made automatically, this quantity may be regarded as the true wave and armature time. In the other measurements the comparisons were made by the use of the mirror galvanometer, and the personal equation of the observers in noting the mirror signals is involved in the quantity ω.

Finally the resulting latitudes and longitudes of the various stations, reduced to the adopted landmarks at each station, are given.

Final chronometer corrections from observations by Lieut. J. A. Norris, U. S. Navy.

Place.	Date.	Chronometer.	Epoch of reduction.	ΔT at epoch of reduction.	Hourly rate.	Epoch of comparison.	ΔT at epoch of comparison.
			h. m.	*h. m. s.*	*s.*	*h. m.*	*h. m. s.*
Coatzacoalcos	1888. Dec. 29	1295	3 44.0	−0 48 36.089	+0.071	7 25.8	−0 48 35.826
	Dec. 30	1295	5 11.3	−0 48 34.283	+0.069	5 25.1	−0 48 34.267
	1889. Jan. 7	1295	4 27.8	−0 48 21.892	+0.062	. . . .	. . . .
	Jan. 12	1295	3 3.8	−0 48 14.650	+0.061	8 27.8	−0 48 14.321
	Jan. 14	1295	3 21.2	−0 48 11.422	+0.080	. . . .	. . . .
	Jan. 15	1295	3 22.5	−0 48 9.316	+0.094	7 52.3	−0 48 8.893
	Jan. 16	1295	3 7.9	−0 48 7.058	+0.091	7 55.7	−0 48 6.621
	Jan. 17	1295	3 18.5	−0 48 5.087	+0.072	8 24.6	−0 48 4.720
Salina Cruz	Feb. 9	1295	9 48.8	−0 53 58.103	+0.188	. . . .	. . . .
	Feb. 10	1295	6 58.8	−0 53 54.265	+0.178	5 45.8	−0 53 54.482
	Feb. 11	1295	6 42.7	−0 53 50.122	+0.169	. . .	. . . .
	Feb. 12	1295	6 30.6	−0 53 46.241	+0.159	11 31.8	−0 53 45.443
	Feb. 13	1295	6 28.4	−0 53 42.494	+0.157	9 24.2	−0 53 42.034
	Feb. 14	1295	6 30.5	−0 53 38.596	+0.169	9 39.3	−0 53 38.064
	Feb. 15	1295	6 53.3	−0 53 34.368	+0.173	9 39.8	−0 53 33.830
	Feb. 16	1295	6 42.9	−0 53 30.316	+0.165	9 46.2	−0 53 29.811

Final chronometer corrections from observations by Lieut. J. A. Norris, U. S. Navy—Continued.

Place.	Date.	Chronometer.	Epoch of reduction.	ΔT at epoch of reduction.	Hourly rate.	Epoch of comparison.	ΔT at epoch of comparison.
	1889.		*h. m.*	*h. m. s.*	*s.*	*h. m.*	*h. m. s.*
La Libertad	Mar. 9	1295	8 43.1	—0 28 35.489	+0.210	. . . .	. . . .
	Mar. 12	1295	7 15.5	—0 28 21.426	+0.189	12 23.3	—0 28 20.456
	Mar. 13	1295	8 22.0	—0 28 16.626	+0.201	11 36.8	—0 28 15.973
	Mar. 14	1295	7 24.0	—0 28 11.859	+0.205	11 36.4	—0 28 10.996
	Mar. 16	1295	7 22.2	—0 28 3.006	+0.174	12 34.3	—0 28 2.101
	Mar. 17	1295	7 17.9	—0 27 58.907	+0.168	8 25.2	—0 27 58.719
	Mar. 18	1295	7 16.3	—0 27 54.976	+0.160	12 50.9	—0 27 54.083
San Juan del Sur	Mar. 30	1295	14 25.9	—0 13 16.336	+0.165	12 39.6	—0 13 16.628
	Mar. 31	1295	9 17.7	—0 13 13.153	+0.170	10 29.4	—0 13 12.949
	Apr. 1	1295	8 56.9	—0 13 9.094	+0.174	12 21.7	—0 13 8.327
	Apr. 2	1295	8 35.8	—0 13 4.976	+0.180	13 43.8	—0 13 4.053
St. Nicolas Mole	Nov. 27	1295	22 34.2	+0 14 53.845	+0.043	. . .	. . . .
	Nov. 28	1295	1 43.2	+0 14 55.365	+0.067	0 31.8	+0 14 55.285
	Nov. 29	1295	22 44.1	+0 14 56.868	+0.070	0 22.6	+0 14 56.983
	Nov. 30	1295	22 53.6	+0 14 58.420	+0.060	0 20.1	+0 14 58.507
	Dec. 1	1295	22 51.9	+0 14 59.770	+0.052	0 43.6	+0 14 59.867
	Dec. 2	1295	23 11.1	+0 15 0.953	+0.047	2 39.7	+0 15 1.116
	Dec. 3	1295	23 26.8	+0 15 2.100	+0.046	0 52.7	+0 15 2.166
	Dec. 4	1295	23 19.7	+0 15 3.172	+0.044	. . .	. . . .
	Dec. 13	1295	23 27.6	+0 15 11.522	+0.074	. . .	. . . .
	Dec. 14	1295	23 26.5	+0 15 13.305	+0.074	1 13.2	+0 15 13.437
	Dec. 15	1295	23 51.3	+0 15 15.032	+0.062	1 56.2	+5 15 15.161
	Dec. 16	1295	0 49.0	+0 15 16.505	+0.075	1 23.9	+0 15 16.549
	Dec. 17	1295	0 17.8	+0 15 18.611	+0.086	. . .	. . . .
	Dec. 18	1295	23 57.2	+0 15 20.314	+0.067	. . .	. . . .
	Dec. 19	1295	0 20.8	+0 15 21.887	+0.066	2 5.0	+0 15 22.002
	Dec. 20	1295	1 15.0	+0 15 23.588	+0.072	2 22.2	+0 15 23.669
	1890.						
Santo Domingo . . .	Jan. 1	1295	3 21.6	+0 29 40.577	+0.032	. . .	. . . .
	Jan. 2	1295	4 12.6	+0 29 41.604	+0.049	3 2.0	+0 29 41.546
	Jan. 3	1295	3 38.5	+0 29 42.829	+0.046	3 8.8	+0 29 42.806
	Jan. 4	1295	3 39.4	+0 29 43.806	+0.050	3 1.0	+0 29 43.774
	Jan. 5	1295	1 52.2	+0 29 45.256	+0.064	2 57.8	+0 29 45.326
	Jan. 6	1295	4 37.8	+0 29 46.845	+0.065	3 23.9	+0 29 46.765
	Jan. 7	1295	3 2.7	+0 29 48.601	+0.089	. . .	. . . .
	Jan. 18	1295	4 18.7	+0 30 4.333	+0.061	. . .	. . . .
	Jan. 20	1295	5 43.4	+0 30 7.418	+0.064	4 49.6	+0 30 7.361
	Jan. 21	1295	4 36.0	+0 30 8.884	+0.064	4 40.2	+0 30 8.888
	Jan. 22	1295	4 34.6	+0 30 10.398	+0.060	5 4.4	+0 30 10.428
	Jan. 23	1295	4 46.8	+0 30 11.798	+0.058	5 10.9	+0 30 11.821
	Jan. 24	1295	4 44.3	+0 30 13.239	+0.060	5 28.8	+0 30 13.284
	Jan. 25	1295	4 15.3	+0 30 14.640	+0.059	5 28.7	+0 30 14.712
	Feb. 5	1295	5 15.2	+0 30 26.474	+0.042	. . .	. . . .
	Feb. 7	1295	5 40.9	+0 30 28.858	+0.057	6 30.4	+0 30 28.905
	Feb. 8	1295	5 32.9	+0 30 30.327	+0.050	6 35.0	+0 30 30.379
	Feb. 9	1295	5 17.8	+0 30 31.277	+0.050	. . .	. . . .
	Feb. 10	1295	6 47.4	+0 30 32.743	+0.055	6 40.2	+0 30 32.736
	Feb. 11	1295	9 36.3	+0 30 34.033	+0.047	6 38.5	+0 30 33.894
	Feb. 13	1295	7 9.0	+0 30 36.517	+0.059	. . .	. . . .

Final chronometer corrections from observations by Lieut. Charles Laird, U. S. Navy.

Place.	Date.	Chronometer.	Epoch of reduction.	ΔT at epoch of reduction.	Hourly rate.	Epoch of comparison.	ΔT at epoch of comparison.
	1888.		h. m.	h. m. s.	s.	h. m.	h. m. s.
Vera Cruz	Dec. 26	1254	4 24.3	−1 13 23.270	+0.043	. .	. . . .
	Dec. 27	1254	4 44.6	−1 13 22.155	+0.041	7 10.0	−1 13 22.053
	Dec. 29	1254	4 7.4	−1 13 20.279	+0.047	7 38.0	−1 13 20.115
	Dec. 30	1254	3 38.1	−1 13 19.118	+0.053	5 31.0	−1 13 19.018
	1889.						
	Jan. 12	1254	4 46.9	−1 13 5.952	+0.051	8 43.0	−1 13 5.752
	Jan. 15	1254	3 38.4	−1 13 2.296	+0.046	8 9.0	−1 13 2.088
	Jan. 16	1254	4 0.6	−1 13 1.189	+0.049	8 8.0	−1 13 0.987
	Jan. 17	1254	4 4.9	−1 12 59.877	+0.057	8 37.0	−1 12 59.618
Coatzacoalcos	Feb. 10	1254	8 2.9	−1 5 32.281	+0.074	5 50.0	−1 5 32.445
	Feb. 12	1254	8 18.6	−1 5 30.315	+0.021	11 40.0	−1 5 30.246
	Feb. 13	1254	6 37.2	−1 5 29.773	+0.069	9 39.1	−1 5 29.524
	Feb. 14	1254	6 4.9	−1 5 28.040	+0.067	9 50.0	−1 5 27.789
	Feb. 15	1254	6 20.9	1 5 26.761	+0.052	9 47.0	−1 5 26.583
	Feb. 16	1254	5 52.6	−1 5 25.370	+0.062	9 57.0	−1 5 25.118
Salina Cruz	Mar. 12	1254	10 15.3	−1 8 45.783	+0.141	12 40.2	−1 8 45.443
	Mar. 13	1254	9 25.0	−1 8 42.481	+0.146	11 52.8	−1 8 42.121
	Mar. 14	1254	9 21.4	−1 8 38.924	+0.151	11 53.4	−1 8 38.542
	Mar. 16	1254	12 38.9	−1 8 30.468	+0.168	12 51.8	−1 8 30.432
	Mar. 17	1254	10 55.0	−1 8 26.871	+0 160	8 42.2	−1 8 27.224
	Mar. 18	1254	9 6.9	−1 8 23.372	+0.158	13 7.9	−1 8 22.737
	Mar. 30	1254	11 18.6	−1 7 49.898	+0.160	12 56.9	−1 7 49.636
	Mar. 31	1254	12 39.5	−1 7 46.172	+0.143	10 47.1	−1 7 46.439
	Apr. 1	1254	10 26.3	−1 7 43.036	+0.140	12 39.0	−1 7 42.727
	Apr. 2	1254	10 40.1	−1 7 39 625	+0.140	14 1.1	−1 7 39.156
Santiago de Cuba . .	Nov. 28	1254	3 15.1	+0 5 39.583	+0.120	0 31.2	+0 5 39.255
	Nov. 29	1254	2 7.2	+0 5 42.357	+0.119	0 21.9	+0 5 42.148
	Nov. 30	1254	2 1.1	+0 5 45.163	+0.121	0 19.5	+0 5 44.959
	Dec. 1	1254	2 10.9	+0 5 48.177	+0.124	0 43.0	+0 5 47.995
	Dec. 2	1254	2 27.8	+0 5 51.145	+0.118	2 39.0	+0 5 51.167
	Dec. 3	1254	1 23.3	+0 5 53.692	+0.110	0 52.0	+0 5 53.635
Port Plata	Dec. 14	1254	3 38.8	+0 26 54.623	+0.094	1 12.3	+0 26 54.394
	Dec. 15	1254	23 58.9	+0 26 56.516	+0.089	1 55.3	+0 26 56.689
	Dec. 16	1254	0 3.4	+0 26 58.572	+0.087	1 23.0	+0 26 58.687
	Dec. 19	1254	0 22.6	+0 27 4.935	+0.086	2 4.0	+0 27 5.080
	Dec. 20	1254	2 37.9	+0 27 7.144	+0.085	2 21.3	+0 27 7.120
	Dec. 28	1254	2 2.5	+0 27 24.927	+0.088	. . . .	. . . .
	1890.						
	Jan. 2	1254	1 33.2	+0 27 35.529	+0.070	3 0.9	+0 27 35.631
	Jan. 3	1254	1 29.1	+0 27 37.173	+0.073	3 7.6	+0 27 37.293
	Jan. 4	1254	1 2.8	+0 27 39.057	+0.086	2 59.8	+0 27 39.225
	Jan. 5	1254	1 34.4	+0 27 41.237	+0.089	2 56.6	+0 27 41.359
	Jan. 6	1254	1 46.6	+0 27 43.381	+0.089	3 22.2	+0 27 43.523
Cruaçao	Jan. 20	1254	4 32.3	+0 35 27.879	+0.123	4 48.0	+0 35 27.911
	Jan. 21	1254	2 22.1	+0 35 30.437	+0.109	4 38.6	+0 35 30.685
	Jan. 22	1254	6 13.1	+0 35 33.263	+0.102	5 2.7	+0 35 33.143
	Jan. 23	1254	3 26.3	+0 35 35.505	+0.110	5 9.3	+0 35 35.694
	Jan. 24	1254	3 19.4	+0 35 38.250	+0.116	5 27.2	+0 35 38.497
	Jan. 25	1254	3 23.7	+0 35 41.023	+0.114	5 27.0	+0 35 41.257
La Guayra	Feb. 7	1254	4 10.9	+0 44 12.576	+0.053	6 28.4	+0 44 12.697
	Feb. 8	1254	4 14.5	+0 44 13.842	+0.055	. .	+0 44 13.971
	Feb. 9	1254	5 19.3	+0 44 15.266	+0.055	. . .	. . . .
	Feb. 10	1254	4 24.5	+0 44 16.553	+0.061	6 38 3	+0 44 16.689
	Feb. 11	1254	4 30.1	+0 44 18.149	+0.068	6 36.5	+0 44 18.292

Differences of chronometer faces from mean of time signals.

Date.	Signals sent. From—	Signals sent. To—	Number of signals.	Mean difference and probable error. Eastern — Western chronometers. h.	m.	s.	s.
1888. Dec. 29	Coatzacoalcos . . .	Vera Cruz	22	—0	17	49.555	±0.000
	Vera Cruz	Coatzacoalcos	25	—0	17	49.478	±0.002
Dec. 30	Coatzacoalcos	Vera Cruz	25	—0	17	50.092	±0.000
	Vera Cruz	Coatzacoalcos	8	—0	17	50.001	±0.002
1889. Jan. 12	Coatzacoalcos	Vera Cruz	25	—0	17	56.744	±0.001
	Vera Cruz	Coatzacoalcos	25	—0	17	56.620	±0.001
Jan. 15	Coatzacoalcos	Vera Cruz	25	—0	17	58.720	±0.001
	Vera Cruz	Coatzacoalcos	25	—0	17	58.607	±0.001
Jan. 16	Coatzacoalcos	Vera Cruz	25	—0	17	59.670	±0.001
	Vera Cruz	Coatzacoalcos	25	—0	17	59.550	±0.000
Jan. 17	Coatzacoalcos	Vera Cruz	25	—0	18	0.438	±0.001
	Vera Cruz	Coatzacoalcos	25	—0	18	0.313	±0.001
Feb. 10	Salina Cruz	Coatzacoalcos	15	+0	14	43.227	±0.001
	Coatzacoalcos	Salina Cruz	25	+0	14	43.136	±0.001
Feb. 12	Salina Cruz	Coatzacoalcos	15	+0	14	49.817	±0.002
	Coatzacoalcos	Salina Cruz	25	+0	14	49.770	±0.001
Feb. 13	Salina Cruz	Coatzacoalcos	25	+0	14	52.500	±0.001
	Coatzacoalcos	Salina Cruz	25	+0	14	52.427	±0.001
Feb. 14	Salina Cruz	Coatzacoalcos	25	+0	14	55.296	±0.001
	Coatzacoalcos	Salina Cruz	25	+0	14	55.247	±0.001
Feb. 15	Salina Cruz	Coatzacoalcos	25	+0	14	57.933	±0.001
	Coatzacoalcos . . .	Salina Cruz	25	+0	14	57.899	±0.000
Feb. 16	Salina Cruz	Coatzacoalcos	25	+0	15	0.515	±0.001
	Coatzacoalcos	Salina Cruz	25	+0	15	0.452	±0.001
Mar. 12	La Libertad	Salina Cruz	70	—0	16	57.967	±0.003
	Salina Cruz	La Libertad	68	—0	16	57.316	±0.004
Mar. 13	La Libertad	Salina Cruz	67	—0	16	59.155	±0.003
	Salina Cruz	La Libertad	67	—0	16	58.561	±0.004
Mar. 14	La Libertad	Salina Cruz	74	—0	17	0.485	±0.003
	Salina Cruz	La Libertad	62	—0	16	59.891	±0.003
Mar. 16	La Libertad	Salina Cruz	64	—0	17	1.325	±0.003
	Salina Cruz	La Libertad	67	—0	17	0.756	±0.002

Differences of chronometer faces from mean of time signals—Continued.

Date.	Signals sent. From—	To—	Number of signals.	Mean difference and probable error. Eastern — Western chronometers.			
				h.	*m.*	*s.*	*s.*
1889. Mar. 17	La Libertad	Salina Cruz	71	—0	17	1.552	±0.004
	Salina Cruz	La Libertad	66	—0	17	0.906	±0.003
Mar. 18	La Libertad	Salina Cruz	64	—0	17	1.609	±0.004
	Salina Cruz	La Libertad	73	—0	17	1.003	±0.002
Mar. 30	San Juan del Sur	Salina Cruz	73	—0	17	19.593	±0.003
	Salina Cruz	San Juan del Sur	73	—0	17	18.875	±0.003
Mar. 31	San Juan del Sur	Salina Cruz	72	—0	17	19.946	±0.003
	Salina Cruz	San Juan del Sur	73	—0	17	19.237	±0.003
Apr. 1	San Juan del Sur	Salina Cruz	69	—0	17	20.567	±0.003
	Salina Cruz	San Juan del Sur	73	—0	17	19.865	±0.003
Apr. 2	San Juan del Sur	Salina Cruz	64	—0	17	21.630	±0.003
	Salina Cruz	San Juan del Sur	68	—0	17	20.905	±0.003
Nov. 28	St. Nicolas Mole	Santiago de Cuba	71	+0	0	34.050	±0.004
	Santiago de Cuba	St. Nicolas Mole	72	+0	0	34.510	±0.002
Nov. 29	St. Nicolas Mole	Santiago de Cuba	69	+0	0	35.202	±0.003
	Santiago de Cuba	St. Nicolas Mole	71	+0	0	35.666	±0.003
Nov. 30	St. Nicolas Mole	Santiago de Cuba	66	+0	0	36.545	±0.004
	Santiago de Cuba	St. Nicolas Mole	72	+0	0	37.021	±0.002
Dec. 1	St. Nicolas Mole	Santiago de Cuba	62	+0	0	38.160	±0.002
	Santiago de Cuba	St. Nicolas Mole	66	+0	0	38.660	±0.002
Dec. 2	St. Nicolas Mole	Santiago de Cuba	72	+0	0	40.055	±0.003
	Santiago de Cuba	St. Nicolas Mole	72	+0	0	40.529	±0.002
Dec. 3	St. Nicolas Mole	Santiago de Cuba	70	+0	0	41.475	±0.002
	Santiago de Cuba	St. Nicolas Mole	72	+0	0	41.961	±0.003
Dec. 14	St. Nicolas Mole	Port Plata	73	—0	0	54.672	±0.004
	Port Plata	St. Nicolas Mole	72	—0	0	55.115	±0.003
Dec. 15	St. Nicolas Mole	Port Plata	72	—0	0	55.122	±0.003
	Port Plata	St. Nicolas Mole	66	—0	0	55.612	±0.004
Dec. 16	St. Nicolas Mole	Port Plata	74	—0	0	55.833	±0.002
	Port Plata	St. Nicolas Mole	73	—0	0	56.323	±0.003
Dec. 19	St. Nicolas Mole	Port Plata	71	—0	0	56.650	±0.002
	Port Plata	St. Nicolas Mole	68	—0	0	57.126	±0.002

Differences of chronometer faces from mean of time signals—Continued.

Date.	Signals sent. From—	Signals sent. To—	Number of signals.	Mean difference and probable error. Eastern — Western chronometers. h.	m.	s.	s.
1889. Dec. 20	St. Nicolas Mole	Port Plata	70	—0	0	57.068	±0.003
	Port Plata	St. Nicolas Mole	68	—0	0	57.541	±0.003
1890. Jan. 2	Santo Domingo	Port Plata	67	+0	1	8.189	±0.003
	Port Plata	Santo Domingo	70	+0	1	8.654	±0.003
Jan. 3	Santo Domingo	Port Plata	67	+0	1	8.617	±0.003
	Port Plata	Santo Domingo	73	+0	1	9.106	±0.003
Jan. 4	Santo Domingo	Port Plata	70	+0	1	9.421	±0.002
	Port Plata	Santo Domingo	73	+0	1	9.823	±0.003
Jan. 5	Santo Domingo	Port Plata	67	+0	1	10.354	±0.003
	Port Plata	Santo Domingo	68	+0	1	10.750	±0.004
Jan. 6	Santo Domingo	Port Plata	72	+0	1	10.846	±0.003
	Port Plata	Santo Domingo	69	+0	1	11.320	±0.003
Jan. 20	Santo Domingo	Curaçao	71	—0	1	34.150	±0.002
	Curaçao	Santo Domingo	71	—0	1	34.781	±0.003
Jan. 21	Santo Domingo	Curaçao	70	—0	1	35.335	±0.003
	Curaçao	Santo Domingo	69	—0	1	35.906	±0.004
Jan. 22	Santo Domingo	Curaçao	69	—0	1	36.291	±0.003
	Curaçao	Santo Domingo	72	—0	1	36.866	±0.004
Jan. 23	Santo Domingo	Curaçao	69	—0	1	37.420	±0.003
	Curaçao	Santo Domingo	73	—0	1	37.991	±0.003
Jan. 24	Santo Domingo	Curaçao	72	—0	1	38.740	±0.003
	Curaçao	Santo Domingo	67	—0	1	39.344	±0.004
Jan. 25	Santo Domingo	Curaçoa	69	—0	1	40.099	±0.003
	Curaçao	Santo Domingo	73	—0	1	40.664	±0.002
Feb. 7	Santo Domingo	La Guayra	66	—0	1	55.782	±0.003
	La Guayra	Santo Domingo	67	—0	1	56.448	±0.003
Feb. 8	Santo Domingo	La Guayra	69	—0	1	55.754	±0.002
	La Guayra	Santo Domingo	64	—0	1	56.425	±0.003
Feb. 10	Santo Domingo	La Guayra	73	—0	1	56.042	±0.002
	La Guayra	Santo Domingo	73	—0	1	56.694	±0.003
Feb. 11	Santo Domingo	La Guayra	67	—0	1	56.403	±0.003
	La Guayra	Santo Domingo	69	—0	1	57.079	±0.003

Differences of longitude deduced from exchange of time signals.

Eastern and Western Stations.	Date.	Observer.	Position of observer.	Number of time stars observed.	$\triangle Te$ and $\triangle Tw$	$\triangle Te - \triangle Tw$	Number of chronometer comparisons.	T′ and T″	λ′ and λ″	½(λ′ − λ″)	ω
	1888.				*h. m. s.*	*m. s.*		*m. s.*	*m. s.*	*m. s.*	*s.*
Coatzacoalcos	Dec. 29	N.	E.	19	−0 48 35.826	+24 44.289	22	−17 49.555	+ 6 54.734	+ 6 54.772	0.038
Vera Cruz		L.	W.	12	−1 13 20.115		25	−17 49.478	+ 6 54.811		
Coatzacoalcos	Dec. 30	N.	E.	9	−0 48 34.267	+24 44.751	25	−17 50.092	+ 6 54.659	+ 6 54.704	0.046
Vera Cruz		L.	W.	15	−1 13 19.018		8	−17 50.001	+ 6 54.750		
	1889.										
Coatzacoalcos	Jan. 12	N.	E.	11	−0 48 14.321	+24 51.431	25	−17 56.744	+ 6 54.687	+ 6 54.749	0.062
Vera Cruz		L.	W.	12	−1 13 5.752		25	−17 56.620	+ 6 54.811		
Coatzacoalcos	Jan. 15	N.	E.	14	−0 48 8.893	+24 53.195	25	−17 58.720	+ 6 54.475	+ 6 54.532	0.056
Vera Cruz		L.	W.	16	−1 13 2.088		25	−17 58.607	+ 6 54.588		
Coatzacoalcos	Jan. 16	N.	E.	12	−0 48 6.621	+24 54.366	25	−17 59.670	+ 6 54.696	+ 6 54.756	0.060
Vera Cruz		L.	W.	18	−1 13 0.987		25	−17 59.550	+ 6 54.816		
Coatzacoalcos .	Jan. 17	N.	E.	11	−0 48 4.720	+24 54.898	25	−18 0.438	+ 6 54.460	+ 6 54.522	0.062
Vera Cruz		L.	W.	16	−1 12 59.618		25	−18 0.313	+ 6 54.585		
										+ 6 54.672	
Coatzacoalcos	Feb. 10	L.	E.	12	−1 5 32.445	−11 37.963	15	+14 43.227	+ 3 5.264	+ 3 5.218	0.046
Salina Cruz		N.	W.	12	−0 53 54.482		25	+14 43.136	+ 3 5.173		
Coatzacoalcos . .	Feb. 12	L.	E.	16	−1 5 30.246	−11 44.803	15	+14 49.817	+ 3 5.014	+ 3 4.990	0.024
Salina Cruz		N.	W.	12	−0 53 45.443		25	+14 49.770	+ 3 4.967		
Coatzacoalcos	Feb. 13	L.	E.	7	−1 5 29.524	−11 47.490	25	+14 52.500	+ 3 5.010	+ 3 4.974	0.036
Salina Cruz		N.	W.	12	−0 53 42.034		25	+14 52.427	+ 3 4.937		
Coatzacoalcos	Feb. 14	L.	E.	14	−1 5 27.789	−11 49.725	25	+14 55.296	+ 3 5.571	+ 3 5.546	0.024
Salina Cruz		N.	W.	13	−0 53 38.064		25	+14 55.247	+ 3 5.522		
Coatzacoalcos	Feb. 15	L.	E.	16	−1 5 26.583	−11 52.753	25	+14 57.933	+ 3 5.180	+ 3 5.163	0.017
Salina Cruz . .		N.	W.	13	−0 53 33.830		25	+14 57.899	+ 3 5.146		
Coatzacoalcos . . .	Feb. 16	L.	E.	16	−1 5 25.118	−11 55.307	25	+15 0.515	+ 3 5.208	+ 3 5.176	0.032
Salina Cruz		N.	W.	12	−0 53 29.811		25	+15 0.452	+ 3 5.145		
										+ 3 5.178	
La Libertad	Mar. 12	N.	E.	13	−0 28 20.456	+40 24.987	70	−16 57.967	+23 27.020	+23 27.346	0.326
Salina Cruz . . .		L.	W.	15	−1 8 45.443		68	−16 57.316	+23 27.671		
La Libertad	Mar. 13	N.	E.	18	−0 28 15.973	+40 26.148	67	−16 59.155	+23 26.993	+23 27.290	0.297
Salina Cruz		L.	W.	19	−1 8 42.121		67	−16 58.561	+23 27.587		
La Libertad	Mar. 14	N.	E.	12	−0 28 10.996	+40 27.546	74	−17 0.485	+23 27.061	+23 27.358	0.297
Salina Cruz		L.	W.	16	−1 8 38.542		62	−16 59.891	+23 27.655		
La Libertad	Mar. 16	N.	E.	12	−0 28 2.101	+40 28.331	64	−17 1.325	+23 27.006	+23 27.290	0.284
Salina Cruz		L.	W.	16	−1 8 30.432		67	−17 0.756	+23 27.575		
La Libertad	Mar. 17	N.	E.	13	−0 27 58.719	+40 28.505	71	−17 1.552	+23 26.953	+23 27.276	0.323
Salina Cruz		L.	W.	14	−1 8 27.224		66	−17 0.906	+23 27.599		
La Libertad	Mar. 18	N.	E.	13	−0 27 54.083	+40 28.654	64	−17 1.609	+23 27.045	+23 27.348	0.303
Salina Cruz		L.	W.	14	−1 8 22.737		73	−17 1.003	+23 27.651		
										+23 27.318	

Differences of longitude deduced from exchange of time signals—Continued.

Eastern and Western Stations.	Date.	Observer.	Position of observer.	Number of time stars observed.	$\triangle Te$ and $\triangle Tw$	$\triangle Te - \triangle Tw$	Number of chronometer comparisons.	T′ and T″	λ′ and λ″	½(λ′ − λ″)	ω
	1889.				*h. m. s.*	*m. s.*		*m. s.*	*m. s.*	*m. s.*	*s.*
San Juan del Sur	Mar. 30	N.	E.	12	−0 13 16.628	+54 33.008	73	−17 19.593	+37 13.415	+37 13.774	0.359
Salina Cruz		L.	W.	13	−1 7 49.636		73	−17 18.875	+37 14.133		
San Juan del Sur . . .	Mar. 31	N.	E.	13	−0 13 12.949	+54 33.490	72	−17 19.946	+37 13.544	+37 13.898	0.354
Salina Cruz		L.	W.	18	−1 7 46.439		73	−17 19.237	+37 14.253		
San Juan del Sur	Apr. 1	N.	E.	12	−0 13 8.327	+54 34.400	69	−17 20.567	+37 13.833	+37 14.184	0.351
Salina Cruz		L.	W.	14	−1 7 42.727		73	−17 19.865	+37 14.535		
San Juan del Sur	Apr. 2	N.	E.	12	−0 13 4.053	+54 35.103	64	−17 21.630	+37 13.473	+37 13.836	0.362
Salina Cruz		L.	W.	17	−1 7 39.156		68	−17 20.905	+37 14.198		
										+37 13.923	
St. Nicolas Mole	Nov. 28	N.	E.	12	+0 14 55.285	+9 16.030	71	+0 34.050	+ 9 50.080	+ 9 50.310	0.230
Santiago de Cuba .		L.	W.	16	+0 5 39.255		72	+0 34.510	+ 9 50.540		
St. Nicolas Mole . . .	Nov. 29	N.	E.	12	+0 14 56.983	+9 14.835	69	+0 35.202	+ 9 50.037	+ 9 50.269	0.232
Santiago de Cuba . . .		L.	W.	17	+0 5 42.148		71	+0 35.666	+ 9 50.501		
St. Nicolas Mole . . .	Nov. 30	N.	E.	13	+0 14 58.507	+9 13.548	66	+0 36.545	+ 9 50.093	+ 9 50.331	0.238
Santiago de Cuba . .		L.	W.	15	+0 5 44.959		72	+0 37.021	+ 9 50.569		
St. Nicolas Mole . . .	Dec. 1	N.	E.	12	+0 14 59.867	+9 11.872	62	+0 38.160	+ 9 50.032	+ 9 50.282	0.250
Santiago de Cuba . .		L.	W.	14	+0 5 47.995		66	+0 38.660	+ 9 50.532		
St. Nicolas Mole . .	Dec. 2	N.	E.	12	+0 15 1.116	+9 9.949	72	+0 40.055	+ 9 50.004	+ 9 50.241	0.237
Santiago de Cuba . .		L.	W.	14	+0 5 51.167		72	+0 40.529	+ 9 50.478		
St. Nicolas Mole . . .	Dec. 3	N.	E.	12	+0 15 2.166	+9 8.531	70	+0 41.475	+ 9 50.006	+ 9 50.249	0.243
Santiago de Cuba . . .		L.	W.	14	+0 5 53.635		72	+0 41.961	+ 9 50.492		
										+ 9 50.280	
Port Plata	Dec. 14	L.	E.	12	+0 26 54.394	+11 40.957	73	−0 54.672	+10 46.285	+10 46.064	0.222
St. Nicolas Mole		N.	W.	12	+0 15 13.437		72	−0 55.115	+10 45.842		
Port Plata	Dec. 15	L.	E.	7	+0 26 56.689	+11 41.528	72	−0 55.122	+10 46.406	+10 46.161	0.245
St. Nicolas Mole		N.	W.	12	+0 15 15.161		66	−0 55.612	+10 45.916		
Port Plata	Dec. 16	L.	E.	12	+0 26 58.687	+11 42.138	74	−0 55.833	+10 46.305	+10 46.060	0.245
St. Nicolas Mole		N.	W.	12	+0 15 16.549		73	−0 56.323	+10 45.815		
Port Plata	Dec. 19	L.	E.	15	+0 27 5.080	+11 43.078	71	−0 56.650	+10 46.428	+10 46.190	0.238
St. Nicolas Mole		N.	W.	14	+0 15 22.002		68	−0 57.126	+10 45.952		
Port Plata	Dec. 20	L.	E.	13	+0 27 7.120	+11 43.451	70	−0 57.068	+10 46.383	+10 46.146	0.236
St. Nicolas Mole		N.	W.	12	+0 15 23.669		68	−0 57.541	+10 45.910		
										+10 46.124	

Differences of longitude deduced from exchange of time signals—Continued.

Eastern and Western stations.	Date.	Observer.	Position of observer.	Number of time stars observed.	△Te *and* △Tw	△Te—△Tw	Number of chronometer comparisons.	T′ *and* T″	λ′ *and* λ″	½ (λ′+λ″)	ω
	1890.				*h. m. s.*	*m. s.*		*m. s.*	*m. s.*	*m. s.*	*s.*
Santo Domingo	Jan. 2	N.	E.	12	+0 29 41.546	+ 2 5.915	67	+1 8.189	+ 3 14.104	+ 3 14.336	0.232
Port Plata		L.	W.	10	+0 27 35.631		70	+1 8.654	+ 3 14.569		
Santo Domingo	Jan. 3	N.	E.	13	+0 29 42.806	+ 2 5.513	67	+1 8.617	+ 3 14.130	+ 3 14.374	0.244
Port Plata		L.	W.	10	+0 27 37.293		73	+1 9.106	+ 3 14.619		
Santo Domingo	Jan. 4	N.	E.	13	+0 29 43.774	+ 2 4.549	70	+1 9.421	+ 3 13.970	+ 3 14.171	0.201
Port Plata		L.	W.	11	+0 27 39.225		73	+1 9.823	+ 3 14.372		
Santo Domingo	Jan. 5	N.	E.	11	+0 29 45.326	+ 2 3.967	67	+1 10.354	+ 3 14.321	+ 3 14.519	0.198
Port Plata		L.	W.	12	+0 27 41.359		68	+1 10.750	+ 3 14.717		
Santo Domingo . . .	Jan. 6	N.	E.	12	+0 29 46.765	+ 2 3.242	72	+1 10.846	+ 3 14.088	+ 3 14.325	0.237
Port Plata . .		L.	W.	11	+0 27 43.523		69	+1 11.320	+ 3 14.562		
										+ 3 14.345	
Curaçao.	Jan. 20	L.	E.	15	+0 35 27.911	+ 5 20.550	71	—1 34.150	+ 3 46.400	+ 3 46.084	0.316
Santo Domingo. . . .		N.	W.	12	+0 30 7.361		71	—1 34.781	+ 3 45.769		
Curaçao.	Jan. 21	L.	E.	12	+0 35 30.685	+ 5 21.797	70	—1 35.335	+ 3 46.462	+ 3 46.176	0.286
Santo Domingo. . . .		N.	W.	12	+0 30 8.888		69	—1 35.906	+ 3 45.891		
Curacao.	Jan. 22	L.	E.	14	+2 35 33.143	+ 5 22.715	69	—1 36.291	+ 3 46.424	+ 3 46.136	0.288
Santo Domingo. . . .		N.	W.	12	+0 30 10.428		72	—1 36.866	+ 3 45.849		
Curaçao.	Jan. 23	L.	E.	13	+0 35 35.694	+ 5 23.873	69	—1 37.420	+ 3 46.453	+ 3 46.168	0.286
Santo Domingo. . . .		N.	W.	12	+0 30 11.821		73	—1 37.991	+ 3 45.882		
Caraçao.	Jan. 24	L.	E.	15	+0 35 38.497	+ 5 25.213	72	—1 38.740	+ 3 46.473	+ 3 46.171	0.302
Santo Domingo. . . .		N.	W.	12	+0 30 13.284		67	—1 39.344	+ 3 45.869		
Curaçao.	Jan. 25	L.	E.	15	+0 35 41.257	+ 5 26.545	69	—1 40.099	+ 3 46.446	+ 3 46.164	0.282
Santo Domingo. . . .		N.	W.	12	+0 30 14.712		73	—1 40.664	+ 3 45.881		
										+ 3 46.150	
La Guayra	Feb. 7	L.	E.	14	+0 44 12.697	+13 43.792	66	—1 55.782	+11 48.010	+11 47.677	0.333
Santo Domingo		N.	W.	12	+0 30 28.905		67	—1 56.448	+11 47.344		
La Guayra	Feb. 8	L.	E.	13	+0 44 13.971	+13 43.592	69	—1 55.754	+11 47.838	+11 47.502	0.336
Santo Domingo		N.	W.	12	+0 30 30.379		64	—1 56.425	+11 47.167		
La Guayra . .	Feb. 10	L.	E.	13	+0 44 16.689	+13 43.953	73	—1 56.042	+11 47.911	+11 47.585	0.326
Santo Domingo . .		N.	W.	12	+0 30 32.736		73	—1 56.694	+11 47.259		
La Gnayra	Feb. 11	L.	E.	13	+0 44 18.292	+13 44.398	67	—1 56.403	+11 47.995	+11 47.657	0.338
Santo Domingo . . .		N.	W.	13	+0 30 33.894		69	—1 57.079	+11 47.319		
										+11 47.605	

RESULTING LATITUDES AND LONGITUDES.

COATZACOALCOS.

The latitude of the Coatzacoalcos transit pier, as determined by thirty-one observations of pairs of stars, is North 18° 8′ 46″.19.

	h.	m.	s.
The telegraphic difference of longitude between the transit piers at Vera Cruz and Coatzacoalcos, the mean of six independent measurements, is	0	6	54.672
The longitude of the pier at Vera Cruz, as determined in 1883 by Commander C. H. Davis, U. S. Navy, is	6	24	33.974
Longitude of Coatzacoalcos pier	6	17	39.302

To reduce the position of the transit pier to the position of the light-house, a correction of +10″.11 must be applied to the latitude and —0s.193 to the longitude. (See description of stations.)

Applying these corrections gives—

Light-house: Lat. N. 18° 8′ 56″.30; Long. W. 6h 17m 39s.109; Or in arc 94° 24′ 46″.635

SALINA CRUZ.

The latitude of the Salina Cruz transit pier, as determined by twenty-eight observations of pairs of stars, is North 16° 10′ 6″.74.

	h.	m.	s.
The telegraphic difference of longitude between the transit piers at Coatzacoalcos and Salina Cruz, the mean of six independent measurements, is	0	3	5.178
The longitude of the pier at Coatzacoalcos is	6	17	39.302
Longitude of Salina Cruz pier	6	20	44.480

To reduce the position of the transit pier to the position of the observation spot on the summit of the Morro de Salinas, a correction of —30″.83 must be applied to the latitude and +4s.586 to the longitude. (See description of stations.)

Applying these corrections gives—

Observation spot on summit of Morro de Salinas: Lat. N. 16° 9′ 35″.91; Long. W. 6h 20m 49s.066; Or in arc 95° 12′ 15″ 990

LA LIBERTAD.

The latitude of the transit pier at La Libertad was not determined.

	h.	m.	s.
The telegraphic difference of longitude between the transit piers at Salina Cruz and La Libertad, the mean of six independent measurements, is	0	23	27.318
The longitude of the pier at Salina Cruz is	6	20	44.480
Longitude of La Libertad pier	5	57	17.162
To reduce to the position of Lieutenant Laird's pier used in 1884 there must be applied +			0.030
Longitude of Lieutenant Laird's pier, depending on Salina Cruz	5	57	17.192
Longitude of Lieutenant Laird's pier, depending on Panama	5	57	17.375
The difference between the two telegraphically determined longitudes of Lieutenant Laird's pier is			0.183

To reduce the longitude of Lieutenant Laird's pier to that of the inshore end of the iron wharf there must be applied a correction of +0.^{s}098. (See Telegraphic Longitude Report of 1883–'84.)

Applying this correction gives—

Inshore end of iron wharf { Long. W. 5^h 57^m 17^s.290; Or in arc 89° 19′ 19″.350 }

SAN JUAN DEL SUR.

The latitude of the San Juan del Sur transit pier, as determined by twenty observations of pairs of stars, is North 11° 15′ 5″.63.

	h.	m.	s.
The telegraphic difference of longitude between the transit piers at Salina Cruz and San Juan del Sur, the mean of four independent determinations, is	0	37	13.923
The longitude of the pier at Salina Cruz is	6	20	44.480
Longitude of transit pier at San Juan del Sur	5	43	30.557

To reduce the position of the transit pier to the position of the signal station, a correction of —21″.04 must be applied to the latitude and +1^s.413 to the longitude. (See description of stations.)

Applying these corrections gives—

Signal station { Lat. N. 11° 14′ 44″.59; Long. W. 5^h 43^m 31^s 970; Or in arc 85° 52′ 59″.550 }

ST. NICOLAS MOLE.

The latitude of the transit pier at St. Nicolas Mole, as determined by fifty-two observations of pairs of stars, is North 19° 49′ 14″.96.

	h.	m.	s.
The telegraphic difference of longitude between the transit piers at Santiago de Cuba and St. Nicolas Mole, the mean of six independent determinations, is	0	9	50.280
The longitude of the transit pier at Santiago de Cuba, depending on the position determined by Commander F. M. Green, U. S. Navy, in 1874, is	5	3	21.953
Longitude of transit pier at St. Nicolas Mole	4	53	31.673

To reduce the position of the transit pier to that of the flagstaff at Fort St. George, there must be applied to the latitude a correction of +0″ 10 and to the longitude +0^s.780.

Applying these corrections gives—

Flagstaff at Fort St. George { Lat. N. 19° 49′ 15″.06; Long. W. 4^h 53^m 32^s.453; Or in arc 73° 23′ 6″.795 }

PORT PLATA.

The latitude of the transit pier at Port Plata, as determined by twenty-one observations of pairs of stars, is North 19° 48′ 46″.15.

	h.	m.	s.
The telegraphic difference of longitude between the transit piers at St. Nicolas Mole and Port Plata, the mean of five independent determinations, is	0	10	46.124
The longitude of the transit pier at St. Nicolas Mole is	4	53	31.673
Longitude of transit pier at Port Plata	4	42	45.549

To reduce the position of the transit pier to that of the light-house, a correction of +4″.68 must be applied to the latitude and +0ˢ.218 to the longitude. (See description of stations.)

Applying these corrections gives—

Light-house	Lat. N.	19°	48′	50″.83
	Long. W.	4^h	42^m	$45^s.767$
	Or in arc	70°	41′	26″.505

SANTO DOMINGO.

The latitude of the transit pier at Santo Domingo, as determined by forty-five observations of pairs of stars, is North 18° 28′ 5″.10.

	h.	m.	s.
The telegraphic difference of longitude between the transit piers at Port Plata and Santo Domingo, the mean of five independent determinations, is	0	3	14.345
The longitude of the transit pier at Port Plata is	4	42	45.549
Longitude of transit pier at Santo Domingo	4	39	31.204

To reduce the position of the transit pier to that of the light-house, a correction of —11″.46 must be applied to the latitude and +0ˢ.748 to the longitude. (See description of stations.)

Applying these corrections gives—

Light-house	Lat. N.	18°	27′	53″.64
	Long. W.	4^h	39^m	$31^s.952$
	Or in arc	69°	52′	59″.280

CURAÇAO.

The latitude of the transit pier at Curaçao, as determined by fourteen observations of pairs of stars, is North 12° 6′ 21″.92.

	h.	m.	s.
The telegraphic difference of longitude between the transit piers at Santo Domingo and Curaçao, the mean of six independent measurements, is	0	3	46.150
The longitude of the transit pier at Santo Domingo is	4	39	31.204
Longitude of transit pier at Curaçao	4	35	45.054

To reduce the position of the transit pier to that of Rif Fort light-house, a correction of —1″.83 must be applied to the latitude and +0ˢ.763 to the longitude.

Applying these corrections gives—

Rif Fort light-house	Lat. N.	12°	6′	20″.09
	Long. W.	4^h	35^m	$45^s.817$
	Or in arc	68°	56′	27″.255

LA GUAYRA.

The latitude of the transit pier at La Guayra, as determined by fourteen observations of pairs of stars, is North $10^\circ\ 36'\ 53''.69$.

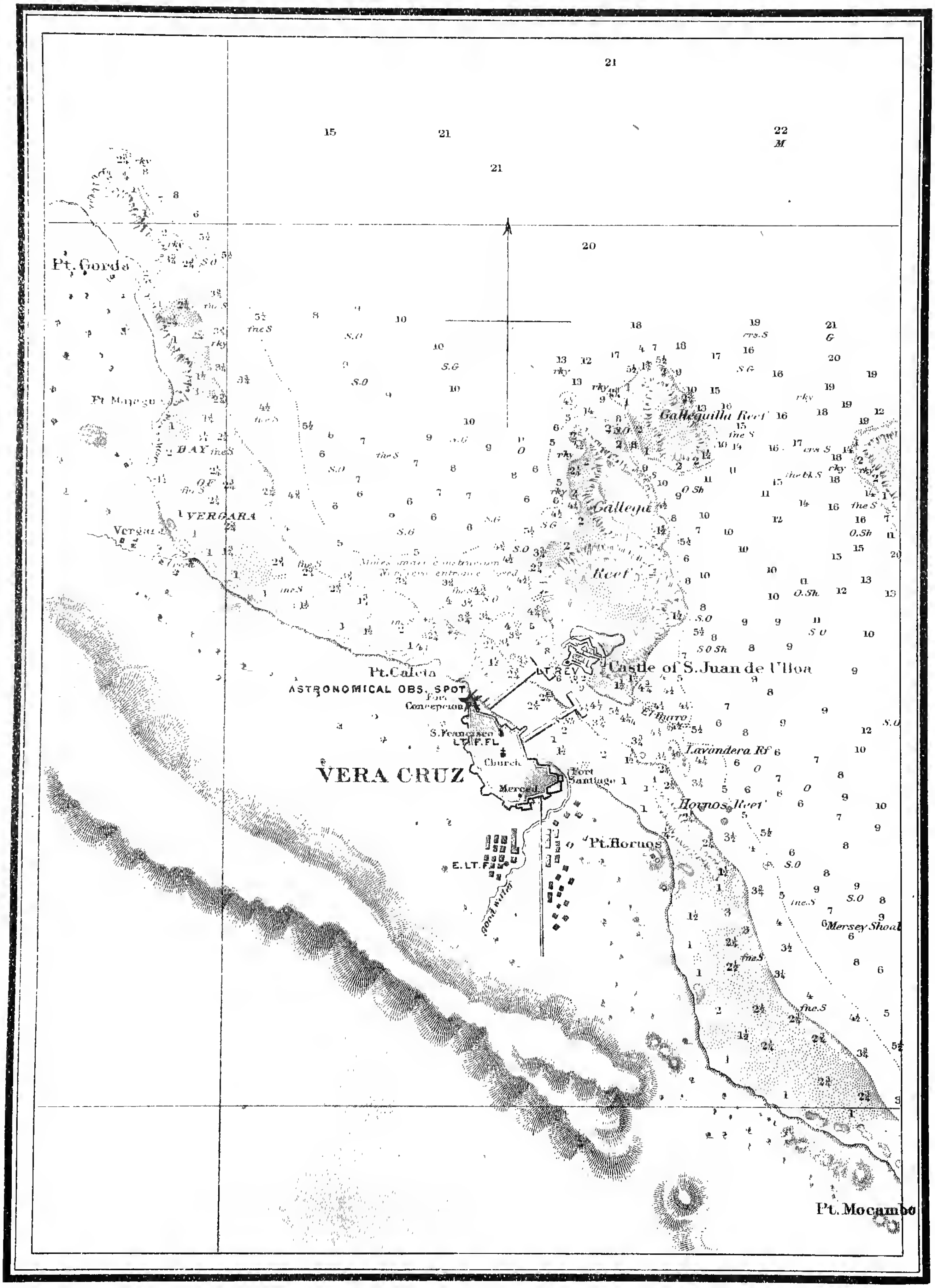
	h.	m.	s.
The telegraphic difference of longitude between the transit piers at Santo Domingo and La Guayra, the mean of four independent determinations, is	0	11	47.605
The longitude of the transit pier at Santo Domingo is	4	39	31.204
Longitude of transit pier at La Guayra	4	27	43.599

To reduce the position of the transit pier to that of the light-house near the breakwater, a correction of $+3''.66$ must be applied to the latitude and $+0^s.772$ to the longitude. (See description of stations.)

Applying these corrections gives—

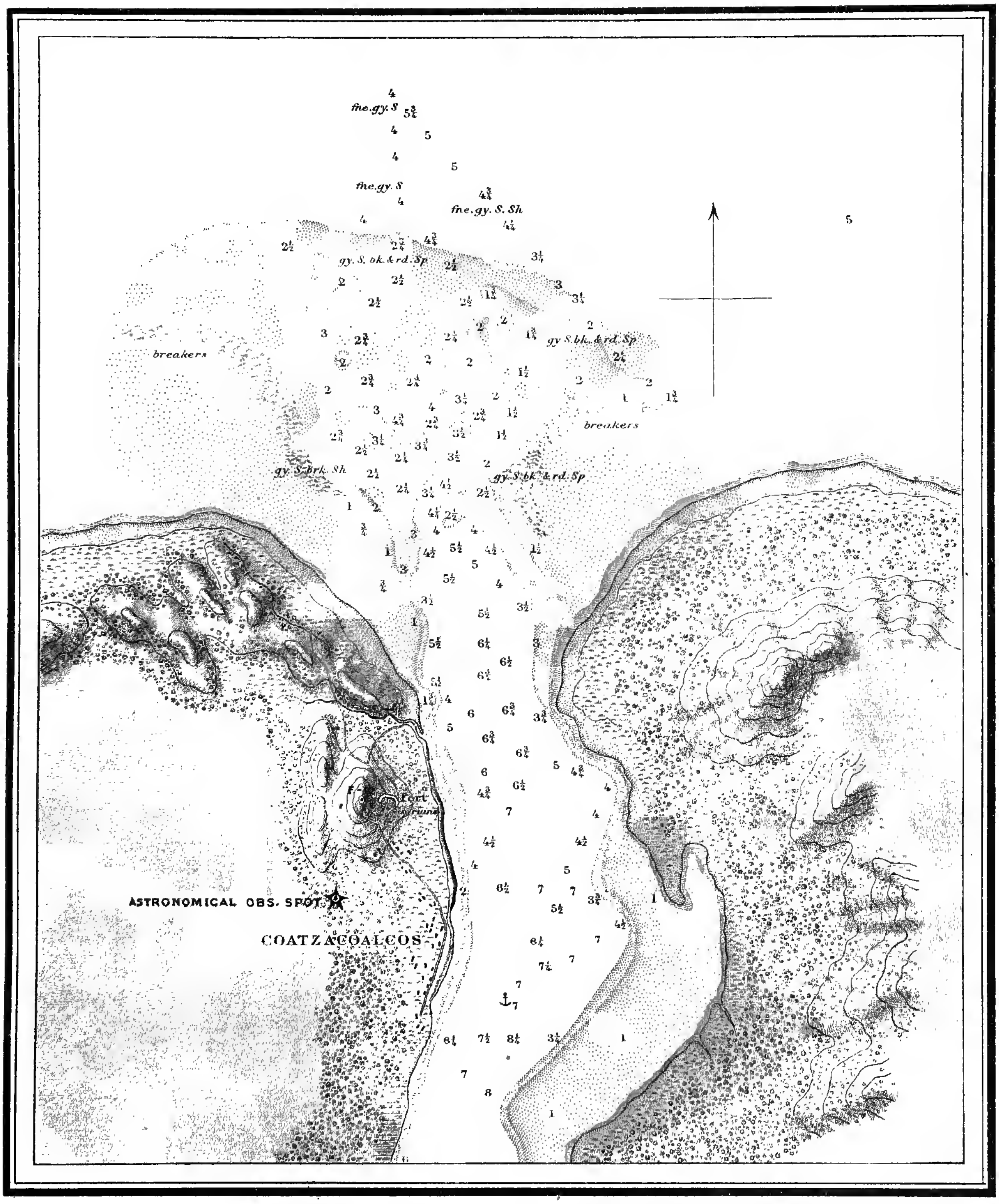
Light-house near breakwater .... $\left\{\begin{array}{llll} \text{Lat. N.} & 10^\circ & 36' & 57''.35 \\ \text{Long. W.} & 4^h & 27^m & 44^s.371 \\ \text{Or in arc} & 66^\circ & 56' & 5''.565 \end{array}\right.$

VERA CRUZ



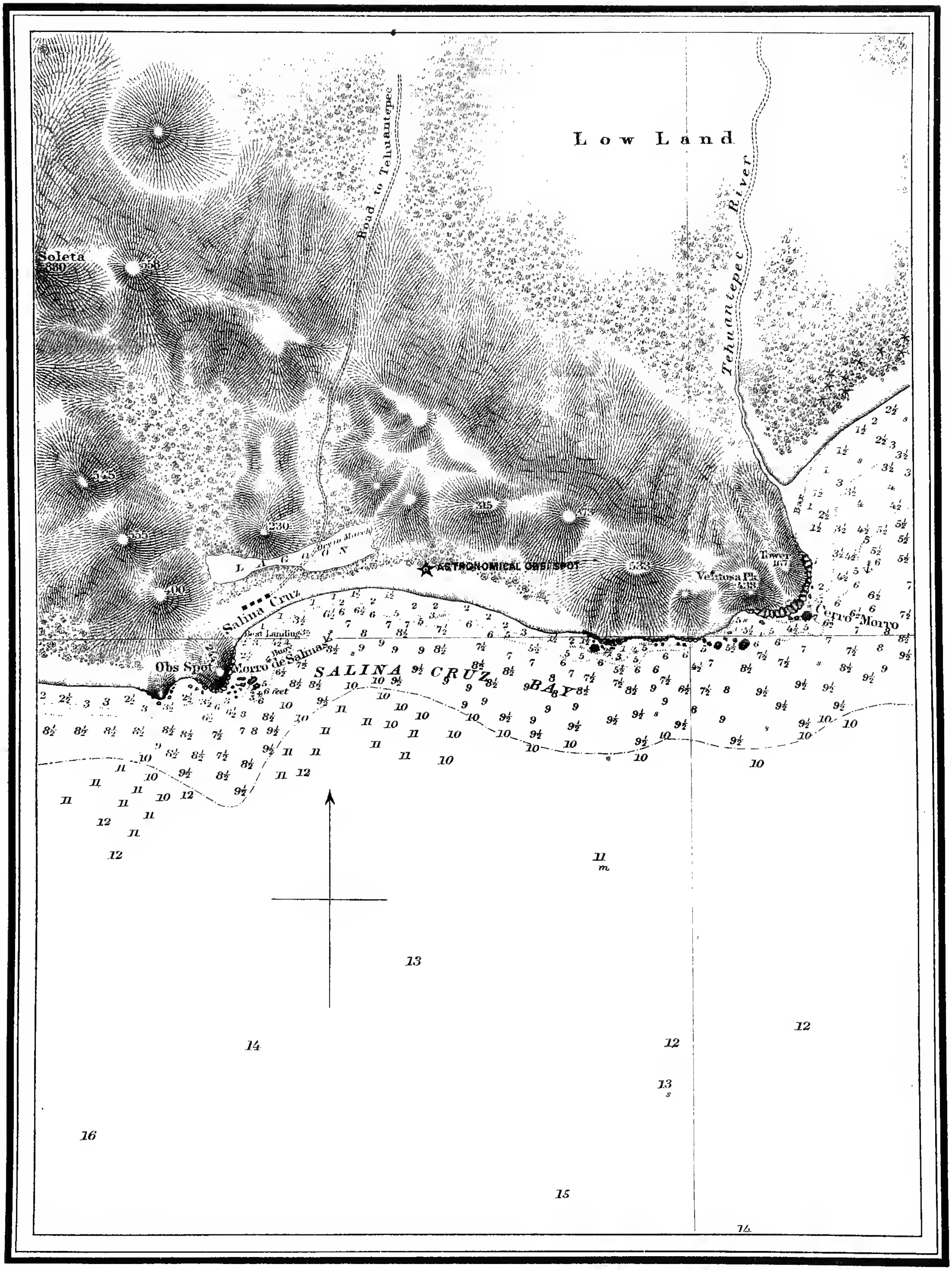
From Hydrographic Office Chart No. 967

COATZACOALCOS RIVER



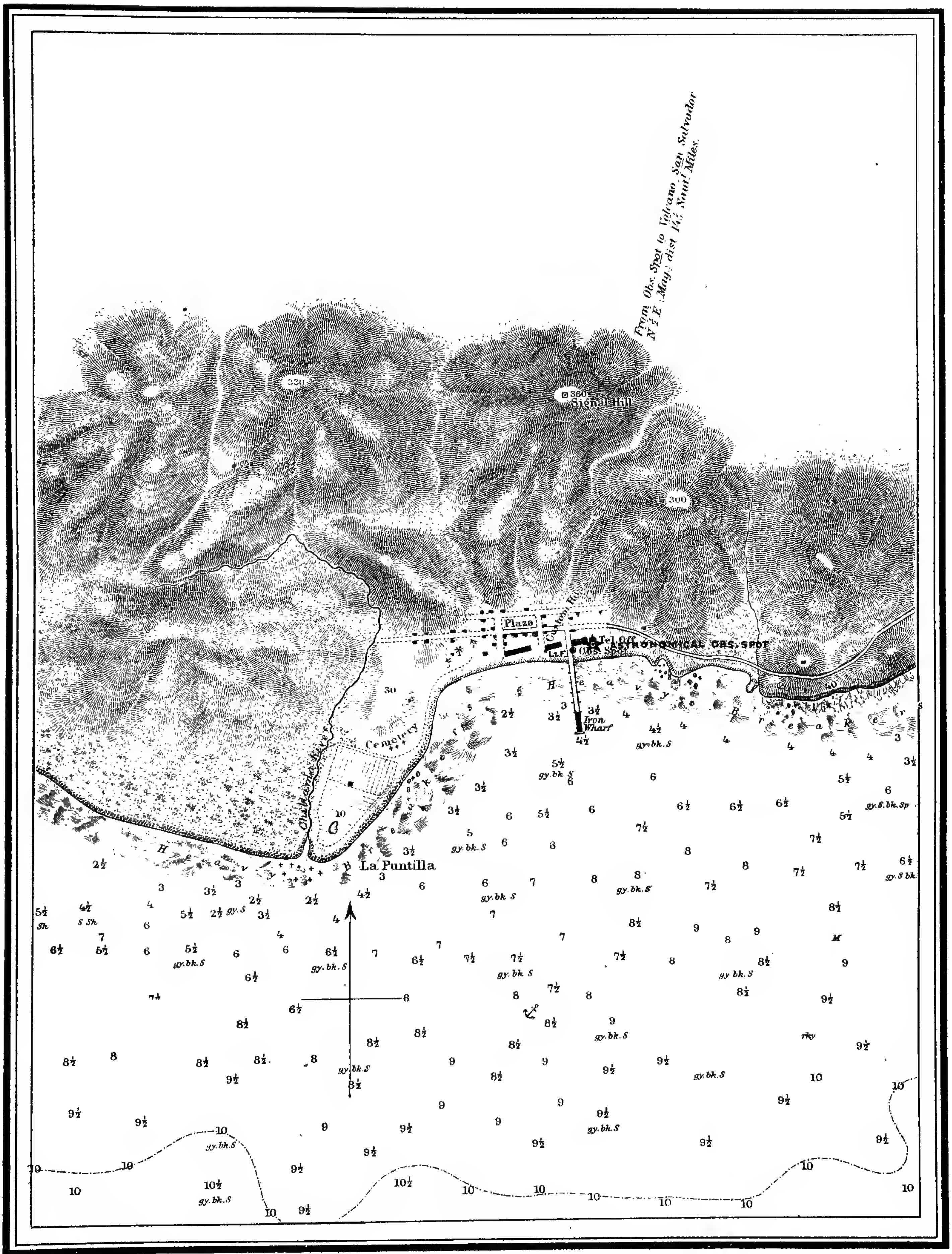
From Hydrographic Office Chart No. 1048

SALINA CRUZ



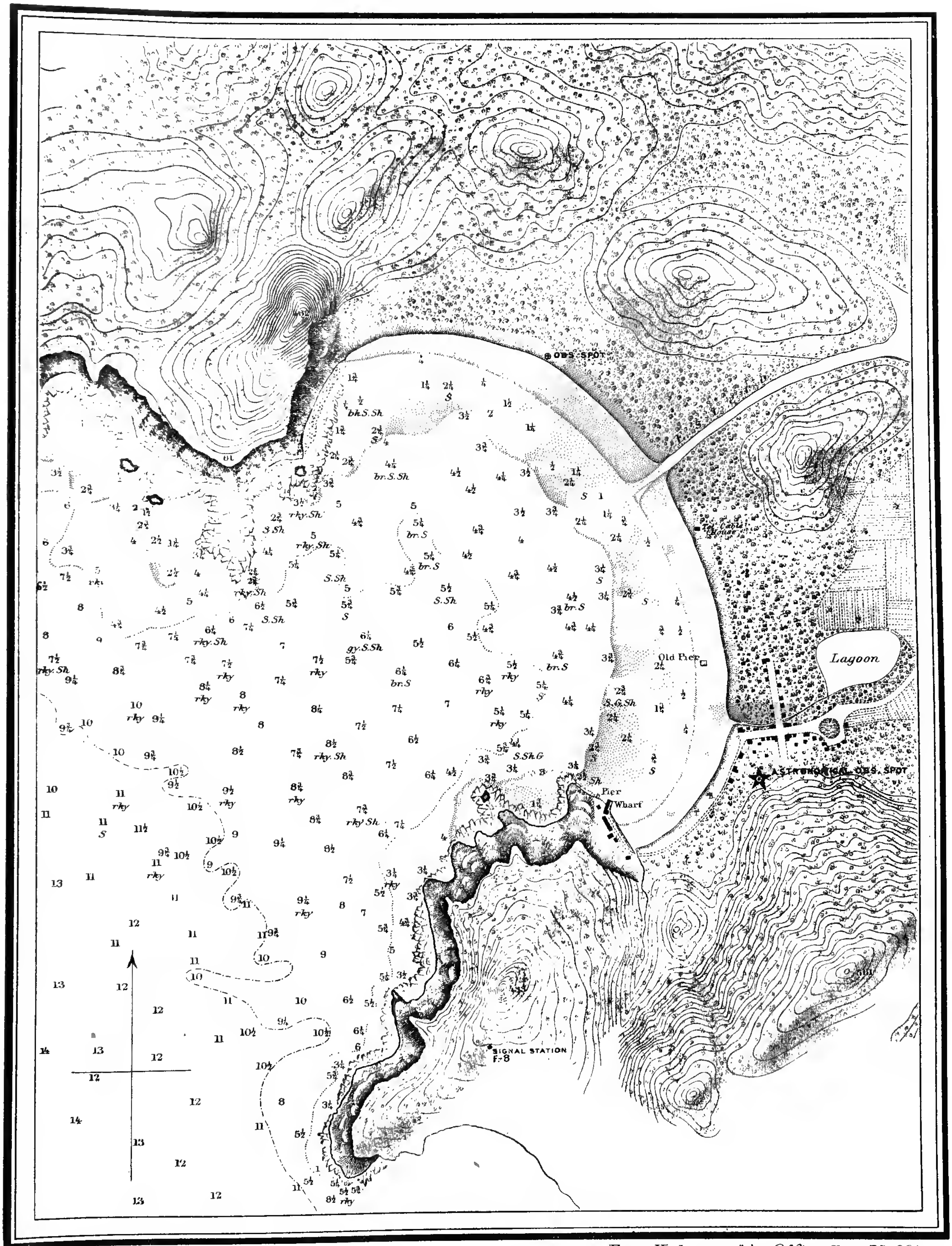
From Hydrographic Office Chart No. 876

LA LIBERTAD



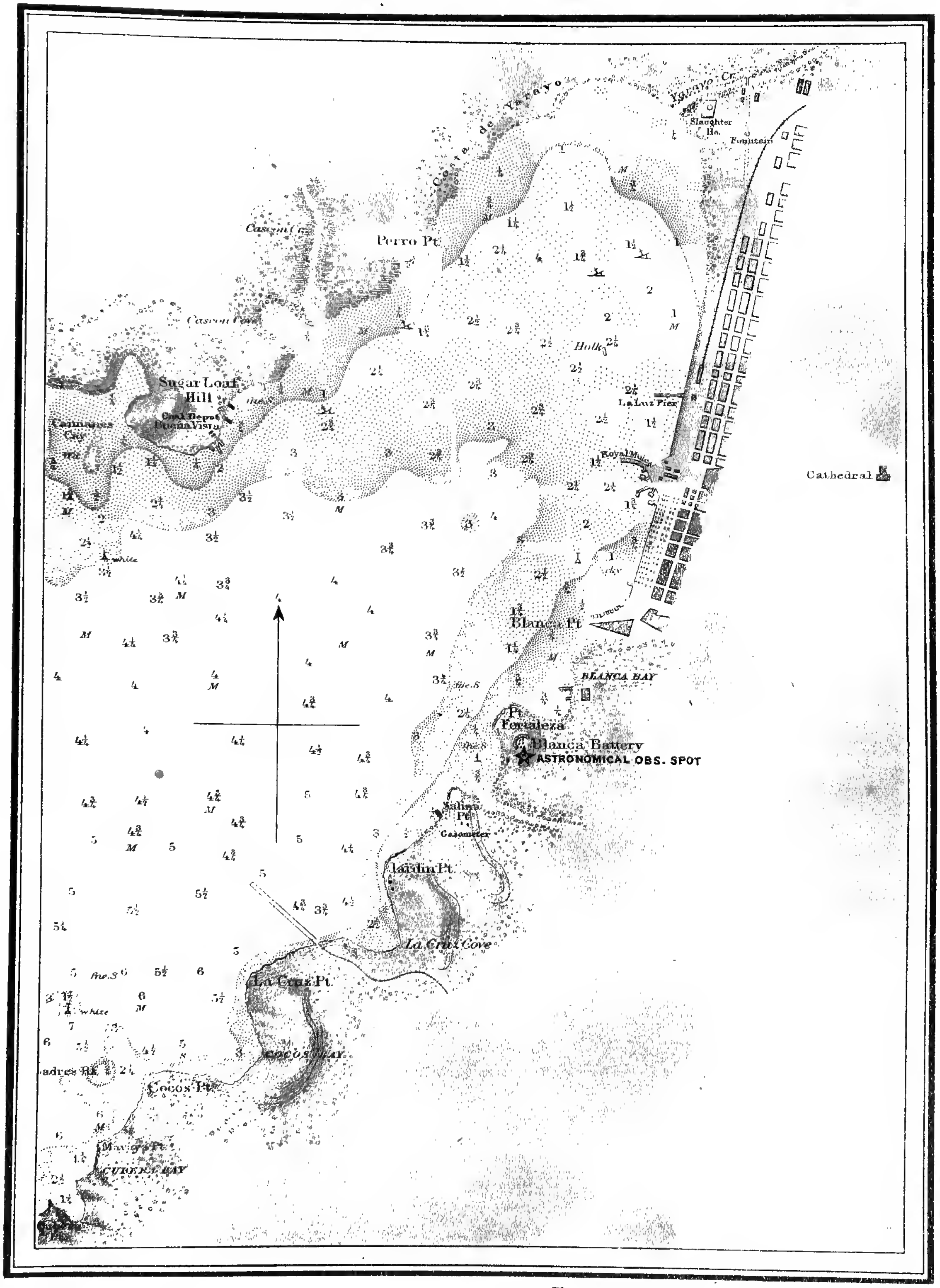
From Hydrographic Office Chart No. 939.

SAN JUAN DEL SUR



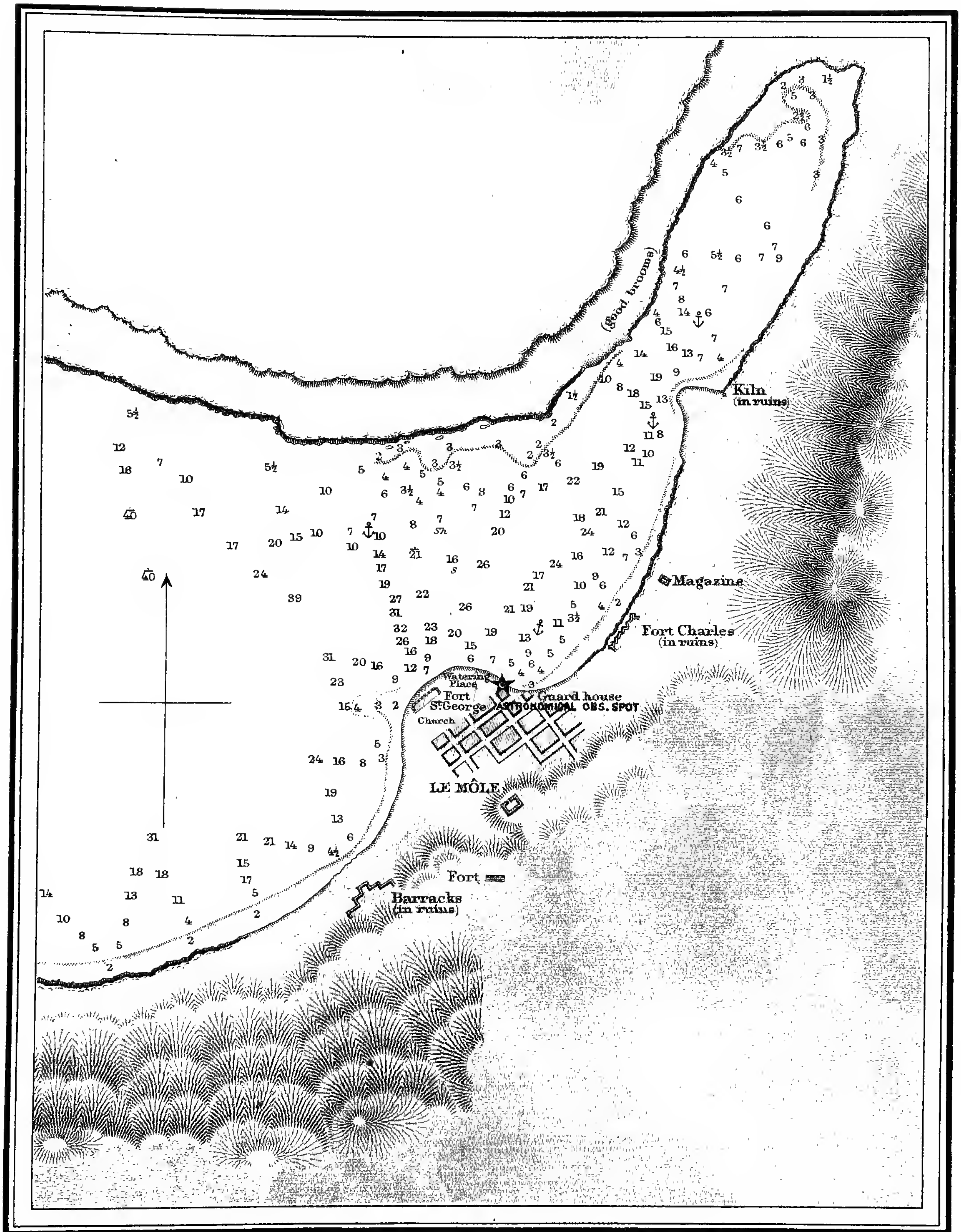
From Hydrographic Office Chart No. 934

SANTIAGO DE CUBA



From Hydrographic Office Chart No. 1003

ST. NICOLAS MÔLE

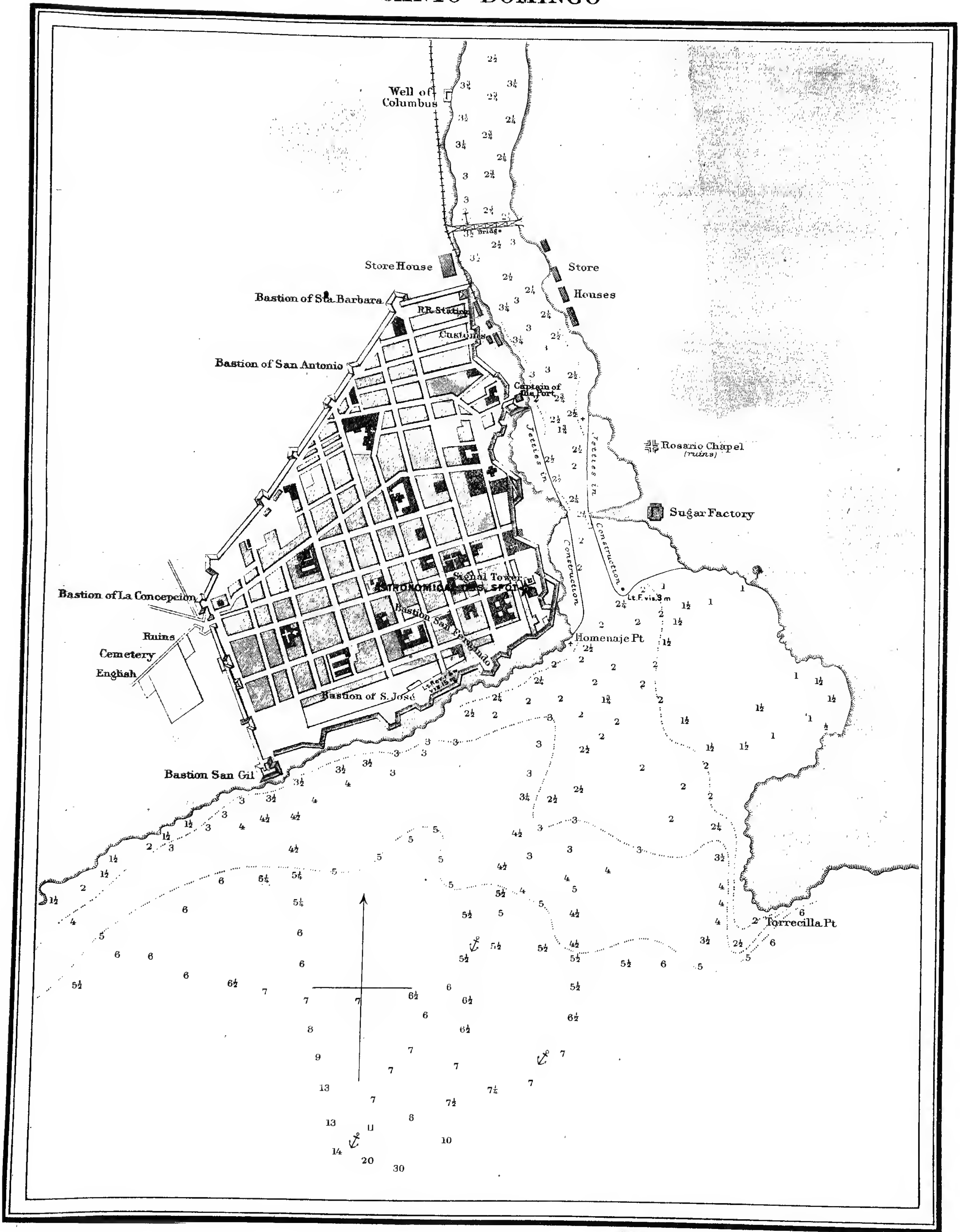


From Hydrographic Office Chart No. 950

PORT PLATA

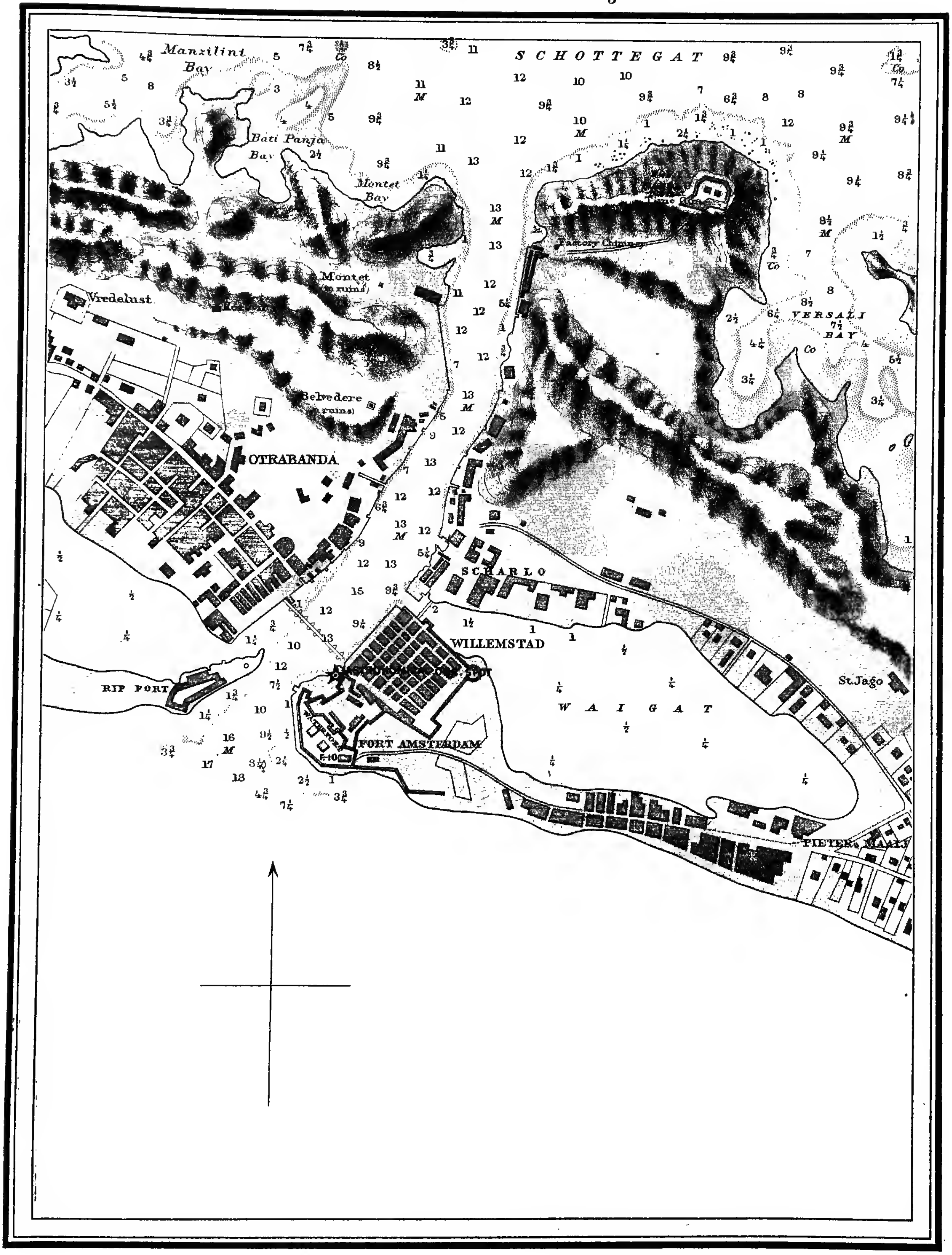
From Hydrographic Office Chart No. 959

SANTO DOMINGO



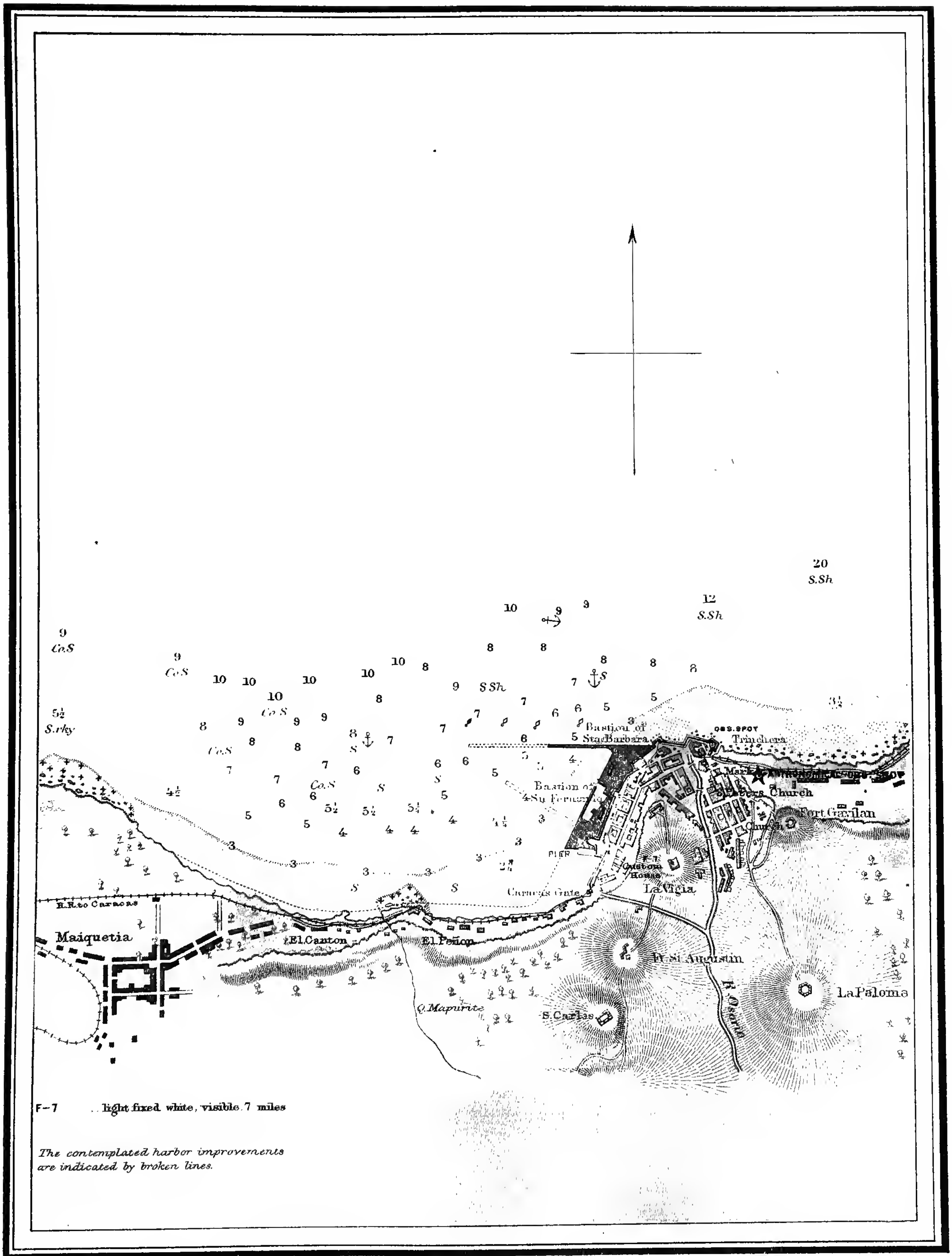
From Hydrographic Office Chart No. 914

SANTA ANA, CURAÇAO



From Hydrographic Office Chart No. 1049

LA GUAYRA



From Hydrographic Office Chart No. 992

APPENDIX.

THE CONSTANTS OF KEW THEODOLITE MAGNETOMETER, NO. 54,

WITH THE

MAGNETIC OBSERVATIONS AND RESULTS OF THE U. S. TELEGRAPHIC LONGITUDE EXPEDITIONS OF 1888 AND 1889, AND 1889 AND 1890, OBSERVED BY LIEUTENANT C. LAIRD AND ENSIGNS J. H. L. HOLCOMBE AND L. M. GARRETT, U. S. N., UNDER THE COMMAND OF LIEUTENANT J. A. NORRIS, U. S. N.

Prepared for publication by

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U. S, HYDROGRAPHIC OFFICE,

Under the direction of

Lieutenant-Commander RICHARDSON CLOVER, U. S. N.,

HYDROGRAPHER.

GENERAL INTRODUCTION.

During the year 1884 the U. S. Hydrographic Office was engaged in charting the area covered by the West Indies and the Caribbean Sea. More data were required for the deduction of the empirical formulæ, based on general mathematical views, which would serve for the computation of the declination (or variation) at any geographical position within that area, and for extending the series of observed values at the important stations sufficiently to provide for the deduction of equations for predicting values of the declination and assigning rates of secular change. In accordance with a scheme submitted by Mr. G. W. Littlehales, C. E., Assistant in charge of the Division of Chart Construction, the commanders of vessels of the North Atlantic Squadron were directed to make observations for the determination of declination at the ports visited by their vessels, and the expedition for the determination of telegraphic longitudes, then fitting out, was supplied with magnetic instruments for the determination of declination, dip, and horizontal force at the astronomical stations to be occupied.

During the winter of 1888–'89, magnetic observations were made at Vera Cruz, Coatzacoalcos, and Salina Cruz, Mexico; similar observations were made at Port Plata, San Domingo, and Curaçao, West Indies, and at La Guayra, Venezuela, during the winter of 1889–'90.

The observations were made during the first season's work by Lieut. Charles Laird and Ensign J. H. L. Holcombe. Ensign Holcombe was relieved by Ensign L. M. Garrett in the fall of 1889.

The instruments furnished the expedition were a Kew unifilar magnetometer and a Barrow dip circle.

The magnetometer, when in use, was supported by a tripod stand similar to that used by photographers; three radial V-grooves supported the leveling screws which form the feet of the instrument. The dip circle was set up on a solid pier built of brick and cement. At all stations except Vera Cruz the instruments, after being mounted, were not dismounted until after the completion of the observations at the station.

At Vera Cruz and Coatzacoalcos one of the observing tents designed by Lieut. J. A. Norris was used to cover the instruments. At the other stations a wall tent, the pins and mountings of which were made of copper, was used.

Independent sets of altitude and time azimuths were taken with a theodolite for the determination of the azimuth of the mark.

DESCRIPTION OF THE STATIONS.

The site selected at Vera Cruz, Mexico, was in the Plaza Baluarte, near the intersection of the Calle de Ocampo and the Avenida de la Playa,

Lat. N. 19° 12′ 2″
Long. W. 96° 7′ 25″

At the other stations the magnetic instruments were set up near the spot at which the astronomical observations were made. A description of these astronomical observation spots is given in that portion of the report referring to the telegraphic determination of longitudes.

At Coatzacoalcos, Mexico, the magnetic station bore 207 feet due north of the transit pier,

Lat. N. 18° 8′ 48″
Long W. 94° 24′ 49″

At Salina Cruz, Mexico, the site selected was N. 15° W. distant 278 feet from the astronomical observation spot,

Lat. N. 16° 10′ 8″
Long. W. 95° 11′ 8″

At Port Plata, San Domingo, the magnetic instruments were set up 96 feet N. 77° W. from the center of the transit pier,

Lat. N. 19° 48′ 46″
Long. W. 70° 41′ 23″

The site selected at Curaçao, West Indies, was in the open space in front of the governor's mansion; the instruments bore W. 24° S. distant 68 feet from the observation spot,

Lat. N. 12° 6′ 21″
Long. W. 68° 56′ 16″

At La Guayra, Venezuela, the magnetic instruments were set up in the vacant lot to the eastward of the market, and bore from the center of the transit pier W. 35° S. distant 210 feet,

Lat. N. 10° 36′ 52″
Long. W. 66° 55′ 56″

Calculation of the value of the horizontal component of the earth's magnetic force from observations of vibration and deflection.

T_0 = observed time of one vibration of the magnet.

T_1 = time of vibration, corrected for rate of chronometer and arc of vibration.

T = time of vibration, corrected for rate of chronometer, arc of vibration, temperature, torsion force of the suspending thread, and induction.

S = daily rate of chronometer, + when gaining, — when losing.

$\alpha\alpha'$ = semiarc of vibration, at the beginning and end of the observation, expressed in parts of radius.

$\frac{h}{F}$ = ratio of the force of torsion of the suspending thread to the magnetic directive force. [This is obtained from the formula $\frac{h}{F} = \frac{v}{90^\circ - v}$ where v = the angle through which the magnet is deflected by a twist of 90° in the thread.]

q = the correction for the decrease of the magnetic moment of the magnet produced by an increase of temperature of 1° Cent. [This correction is not constant at all temperatures, and the correction is more exactly expressed by a formula of the form — correction to $t_0 = q(t_0 - t) + q'(t_0 - t)^2$, t_0 being the observed temperature and t an adopted standard temperature.]

K = Moment of inertia of the magnet, including its suspending stirrup and other appendages. [This is constant for the same magnet and suspension, but varies slightly with temperature, owing to the expansion of the materials.]

π = ratio of the circumference to the diameter of the circle = 3.1415927.

μ = the increase in the magnetic moment of the magnet produced by the inducing action of a magnetic force equal to unity of the metric system of absolute measurement.

r_0 = apparent distance between the centers of the deflecting and suspended magnets in the observation of deflection.

r = distance corrected for error of graduation and temperature [$r = r_0\{1 + 0.000018(t_0 - 0^\circ \text{ Cent.})\}$ + correction for scale error.]

u = observed angle of deflection.

P = a constant, depending upon the distribution of magnetism in the deflecting and suspended magnets. [This is to be determined from several series of observations of deflection at two or more distances. The most convenient distances to be employed are .3 and .4 of a metre. The correction is very small and may remain unapplied until the conclusion of the series.]

m = magnetic moment of the deflecting or vibrating magnet.
H = horizontal component of the earth's magnetic force.
$\frac{m_o}{H_o}$ = approximate value of $\frac{m}{H}$
$\frac{m'}{H'}$ = value of $\frac{m}{H}$ before the application of the correction $\left(1-\frac{P}{r_o^2}\right)$

$$T_1 = T_o\left(1-\frac{S}{86400}-\frac{\alpha\alpha'}{16}\right). \qquad T^2 = T_1^2\left(1+\frac{h}{F}-q\,(t_o-t)+\mu\frac{H_o}{m_o}\right).$$

$$mH = \frac{\pi^2 K}{T^2}$$

$$\frac{m_o}{H_o} = \tfrac{1}{2}r^3 \sin u_o, \qquad \frac{m'}{H'} = \frac{m_o}{H_o}\left(1+\frac{2\mu}{r_o^3}+q(t_o-t)\right), \qquad \frac{m}{H} = \frac{m'}{H'}\left(1-\frac{P}{r_o^2}\right).$$

Let A = value of $\frac{m'}{H'}$ from deflection at the distance r

and A′ = value of $\frac{m'}{H'}$ from deflection at the distance r'

then $$P = \frac{A - A'}{\frac{A}{r^2}-\frac{A'}{r'^2}}$$

The quantity K is obtained by observing the time of vibration of the magnet alternately with its usual mounting and with its moment of inertia increased by the addition of a gun metal ring or cylinder of known weight and dimensions.

When a cylinder is employed the value of K is obtained from the formula $K = W\left(\frac{l^2}{12}+\frac{d^2}{16}\right)\frac{t^2}{t'^2-t^2}$ where W is the weight of the cylinder in grammes, l and d its length and diameter expressed in metres, t' and t being the times of vibration (corrected for torsion, temperature, etc.) of the magnet with and without the additional weight.

Constants, coefficients, and corrections for the unifilar magnetometer No. 54, *by Elliot Bros., London.*

Graduation of deflection bar:

Apparent distance from center of instrument.	True distance at temperature 0° Cent.
0.25	0.24993
0.30	0.29994
0.35	0.34994
0.40	0.39991
0.45	0.44991

Deflection apparatus, angular value of one scale division = 60″.45.

When the scale reading is above the middle point of the scale the correction to the circle reading is *additive*, and when below it is *subtractive*.

Vibration magnet, angular value of one scale division = 1′.8.

The deflecting magnet employed is marked: 54A.

The suspension magnet employed is marked: 54C.

For deflecting magnet:

Correction to o° Cent. $= 0.000357(t_o - 0°) + 0.00000112(t - 0°)^2$

Induction coefficient $\mu = 0.000005$; log. $= 4.72226$.

Log. π^2K at o° Cent. = 9.44474.

Dimensions of inertia cylinder:

Length = 0.09517 metres.

Diameter = 0.00996 metres.

Weight = 63.43 grammes.

TABLES TO FACILITATE THE CALCULATION OF THE OBSERVATIONS.

TABLE I.—*Value of* $\frac{\alpha\alpha'}{16}$ *for different initial and terminal semiarcs of vibration.*

Semiarc at commencement.	Semiarc at end of vibration.					
	80′	70′	60′	50′	40′	30′
′						
100	0.00004	0.00004	0.00003	0.00003	0.00002	0.00002
90	0.00004	0.00003	0.00003	0.00002	0.00002	0.00001
80	0.00003	0.00003	0.00003	0.00002	0.00002	0.00001
70		0.00003	0.00002	0.00002	0.00001	0.00001
60			0.00002	0.00002	0.00001	0.00001
50				0.00001	0.00001	0.00001

TABLE II.—*Value of* $1 + \frac{h}{F}$ *for different values of the deflection produced in the magnet by a twist of* 90° *of the suspension thread.*

Effect of 90° of torsion.	$1 + \frac{h}{F}$	Effect of 90° of torsion.	$1 + \frac{h}{F}$	Effect of 90° of torsion.	$1 + \frac{h}{F}$
′		′		′	
1	1.00019	6	1.00111	11	1.00204
2	0.00037	7	0.00130	12	0.00223
3	0.00056	8	0.00148	13	0.00241
4	0.00074	9	0.00167	14	0.00260
5	0.00093	10	0.00185	15	0.00278

TABLE III.—*Value of* $1 - \frac{S}{86400}$ *for different rates of the chronometer employed.*

Daily Rate.	Chronometer gaining.	Chronometer losing.
Sec.		
5	0.99994	1.00006
10	0.99988	0.00012
15	0.99983	0.00017
20	0.99977	0.00023
25	0.99971	0.00029
30	0.99965	0.00035
35	0.99959	0.00041
40	0.99954	0.00046
45	0.99948	0.00052
50	0.99942	0.00058

TABLE IV.—*Values of* $1 + \frac{2\mu}{r_0^3}$ *for different distances.*

Distance.	$1 + \frac{2\mu}{r_0^3}$
Metres.	
0.250	1.00068
0.300	1.00039
0.350	1.00025
0.400	1.00016
0.450	1.00012

TABLE V.—*Temperature corrections for the magnet* 54 *A*.

Temp. (t_0).	Correction to 0° Cent.	Temp. (t_0).	Correction to 0° Cent.	Temp. (t_0).	Correction to 0° Cent.
Cent. °		*Cent.* °		*Cent.* °	
−5	−0. 00176	+10	+0. 00368	25	+0. 00962
−4	−0. 00141	11	0. 00407	26	0. 01004
−3	−0. 00105	12	0. 00445	27	0. 01046
−2	−0. 00070	13	0. 00484	28	0. 01088
−1	−0. 00035	14	0. 00522	29	0. 01130
0	0. 00000	15	0. 00561	30	0. 01172
+1	+0. 00036	16	0. 00600	31	0. 01215
2	0. 00072	17	0. 00640	32	0. 01258
3	0. 00109	18	0. 00680	33	0. 01301
4	0. 00145	19	0. 00719	34	0. 01344
5	0. 00181	20	0. 00759	35	0. 01387
6	0. 00219	21	0. 00799	36	0. 01431
7	0. 00256	22	0. 00840	37	0. 01475
8	0. 00293	23	0. 00881	38	0. 01519
9	0. 00331	24	0. 00922	39	0. 01563

TABLE VI.—*Value of Log.* π^2 K, *and of Log.* ½ r^3 *for different temperatures.*

Temp. Cent.	Log. π^2 K.	Log. ½ r^3.				
		$r_0 = 0^m.250$.	$r_0 = 0^m.300$.	$r_0 = 0^m.350$.	$r_0 = 0^m.400$.	$r_0 = 0^m.450$
°						
0	9. 44474	7. 89240	8. 13007	8. 33095	8. 50486	8. 65835
5	9. 44479	7. 89251	8. 13019	8. 33107	8. 50498	8. 65847
10	9. 44485	7. 89263	8. 13031	8. 33119	8. 50510	8. 65859
15	9. 44490	7. 89275	8. 13042	8. 33130	8. 50521	8. 65870
20	9. 44496	7. 89287	8. 13054	8. 33142	8. 50533	8. 65882
25	9. 44501	7. 89298	8. 13065	8. 33153	8. 50544	8. 65894
30	9. 44507	7. 89310	8. 13077	8. 33165	8. 50556	8. 65906
35	9. 44512	7. 89 22	8. 13089	8. 33177	8. 50568	8. 65917
40	9. 44518	7. 89334	8. 13101	8. 33189	8. 50580	8. 65929

Metal scale centigrade thermometer belonging to unifilar No. 54, *by Elliot Bros., London (verified in a vertical position).*

Corrections to be applied to the scale readings, determined by comparison with the standard instruments at the Kew Observatory.

At 0° . . . . −0°.4
5° . . . . −0°.5
10° . . . . −0°.5
15° . . . . −0°.5
20° . . . . −0°.5
25° . . . . −0°.4
30° . . . . −0°.3

NOTE I.—When the sign of the correction is +, the quantity is to be *added* to the observed reading, and when −, to be *subtracted* from it.

NOTE II.—As mercurial thermometers are liable to read too high through age, this instrument ought to be again tested, at some future date, at the melting point of ice, and if its reading at that point be found different from the one now given, an appropriate correction should be applied to all the above points.

Observations for azimuth of mark made at Vera Cruz, Mexico, at 5 p. m. January 7, 1889, by Lieut. Charles Laird, with Fauth instrument.

Formula:

$$\tan^2 \tfrac{1}{2} A = \frac{\sin(s-\varphi)\sin(s-h)}{\cos s \quad \cos(s-p)}, \text{ in which}$$

$$s = \tfrac{1}{2}(\varphi + h + p).$$

	Set I. ° ′ ″		Set II. ° ′ ″		Set III. ° ′ ″	
ϕ	19 12 29		19 12 29		19 12 29	
h	7 09 06		5 12 43		4 47 00	
p	112 15 00		112 15 00		112 15 00	
$2s$	138 36 35		136 40 12		136 14 29	
s	69 18 17	sec 10.45174	68 20 06	sec 10.43276	68 07 14	sec 10.42869
$s-\phi$	50 05 48	sin 9.88486	49 07 37	sin 9.87862	48 54 45	sin 9.87720
$s-h$	62 09 11	sin 9.94655	63 07 23	sin 9.95035	63 20 14	sin 9.95117
$s-p$	42 56 43	sec 10.13548	43 54 54	sec 10.14245	44 07 46	sec 10.14402
		2)10.41863		2)10.40418		2)10.40108
½ A	58 18 09	tan 10.20932	57 52 28	tan 10.20209	57 46 56	tan 10.20054
A	116 36 18		115 44 56		115 33 52	

RECAPITULATION.

	Set I.	Set II.	Set III.
	° ′ ″	° ′ ″	° ′ ″
ϕ	19 12 29 N.	19 12 29 N.	19 12 29 N.
h	7 09 06	5 12 43	4 47 00
p	112 15 00	112 15 00	112 15 00
A (from computations)	116 36 18	115 44 56	115 33 52
Circle reads	244 02 27	244 51 18	245 02 57
True meridian reads	0 38 45	0 36 14	0 36 49

	° ′ ″
Mean true meridian	0 37 16
Mark reads	102 49 37
Azimuth of mark	102 12 21

Observations for declination made at Vera Cruz, Mexico, December 21, 1888, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 260°.

Local time.	Scale-readings.		Mean.	Azimuth circle, A ° ′ ″ B
a. m.	Left.	Right.		
h. m.	d.	d.	d.	Remarks:
8 20				Suspended torsion weight.
35				Suspended magnet.
50	34. 2	45. 8	40. 0	
9 00	36. 8	43. 4	40. 1	
15	39. 2	41. 0	40. 1	
30	40. 0	40. 4	40. 2	
45	40. 1	40. 3	40. 2	
10 00	40. 1	40. 3	40. 2	
15	40. 1	40. 3	40. 2	
30	40. 2	40. 4	40. 3	
45	40. 2	40. 4	40. 3	
11 00	40. 3	40. 4	40. 35	
30	40. 3	40. 4	40. 35	
45	40. 3	40. 3	40. 3	Suspended torsion weight.
p. m.	Line of detorsion °			Azimuth circle, A 242 44 00; B 62 44 20
1 30				Remarks: Suspended magnet.
45	37. 6	41. 0	39. 3	
2 00	38. 8	39. 5	39. 3	
15	39. 0	39. 4	39. 2	
30	38. 8	39. 2	39. 0	
45	38. 2	40. 2	39. 2	Magnet vibrating by passing iron.
3 00	39. 2	40. 0	39. 6	
15	39. 6	40. 0	39. 8	Dismounted magnet.

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
20	243 20 50		E	39. 6	40. 6	40. 10		
25	12 00		I	14. 2	11. 2	12. 70	39. 77	26. 23
30	00 00	20 50	E	37. 4	41. 5	39. 45	12. 50	25. 98
35	242 53 50	18 10	I	14. 1	10. 5	12. 30	39. 45	25. 87
40	45 05	14 55	E	38. 1	40. 8	39. 45	12. 20	25. 83
45	35 50	18 00	I	13. 2	11. 0	12. 10	39. 40	25. 75
50	26 50	18 15	E	38. 5	40. 2	39. 35		
55	18 10	17 40						
60	242 08 50	18 00						
Value of one division of scale = 1′.80.			Scale reading of axis . . .					25. 93

	° ′		
Mean scale reading of east and west magnetic elongation			39. 67
Reduction to axis	0 24. 73	= difference =	13. 74
Azimuth circle reads	152 44. 00		
Magnetic meridian reads . .	153 08. 73		
At beginning of a. m. observations		A 158 09 00	
		B 338 09 40	
At end of p. m. observations . . .		A 158 09 20	
		B 338 09 40	
Mean reading of mark . . .	248 09. 41	= 248 09 25	
Azimuth of mark W. of N.	102 12. 35		
True meridian reads. . . .	145 57. 06		
Magnetic declination	7 11. 67	E.	

Observations for declination made at Vera Cruz, Mexico, December 22, 1888, by Lieut. Charles Laird and Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 90°.

Local time.	Scale readings.		Mean.	Azimuth circle, A 242° 44′ 50″; B 62° 44′ 50″
a. m.	Left.	Right.		
h. m.	d.	d.	d.	Remarks:
8 20				Suspended torsion weight.
30				Fibers broke; rove off 4 new fibers.
9 10				Suspended torsion weight.
35				Suspended magnet.
45	38. 6	40. 8	39. 70	Too much weight should not be given first observation — vibrations too great.
10 00	39. 0	40. 2	39. 60	
15	39. 0	40. 0	39. 50	
30	39. 8	39. 4	39. 60	
45	39. 1	39. 8	39. 45	Suspended torsion weight.
p. m.	Line of detorsion, 130°			Azimuth circle, A 242° 45′ 00″; B 62° 45′ 20″
12 45				Remarks: Suspended magnet.
1 05	40. 2	42. 6	41. 40	The temperature suddenly increased about 20° F.
20	40. 9	42. 0	41. 45	
35	41. 7	42. 0	41. 85	Holcombe began to observe.
50	41. 6	41. 9	41. 75	
2 05	41. 4	41. 6	41. 50	
20	41. 4	41. 8	41. 60	
35	41. 6	41. 8	41. 70	
50	41. 8	42. 0	41. 90	

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
10	243 39 20		E	40. 0	40. 0	40. 00		
15	30 40		I	13. 6	12. 0	12. 80	39. 90	26. 35
20	20 30	18. 50	E	38. 0	41. 6	39. 80	13. 10	26. 45
25	11 50	18. 50	I	14. 9	11. 9	13. 40	39. 80	26. 60
30	02 50	17. 40	E	39. 4	40. 2	39. 80	13. 10	26. 45
35	242 54 10	17. 40	I	13. 6	12. 0	12. 80	39. 85	26. 37
40	44 40	18. 10	E	39. 6	40. 2	39. 90		
45	35 55	18. 15						
50	26 40	18. 00						
55	17 30	18. 25						
60	08 20	18. 20						
65	241 59 30	18. 00						
70	50 20	18. 00						
Value of one division of scale = 1′.82.			Scale reading of axis					26. 44

Mean scale reading of east and west magnetic elongation			40. 55
	° ′		
Reduction to axis	0 25. 68	= difference =	14. 11
Azimuth circle reads	152 45. 00		
Magnetic meridian reads . . .	153 10. 68	° ′ ″	
At beginning of a. m. observations	. . . .	A 158 08 20	
		B 338 09 00	
At end of p. m. observations . .	. . . . . .	A 158 08 40	
		B 338 09 00	
Mean reading of mark	248 08. 75	= 248 08 45	
Azimuth of mark W. of N. . . .	102 12. 35		
True meridian reads	145 56. 40		
Magnetic declination	7 14. 28	E.	

Observations for magnetic declination made at Vera Cruz, Mexico, December 23, 1888, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 150°.

Local time.	Scale readings. Left.	Scale readings. Right.	Mean.	
a. m.				Azimuth circle, A 242° 44′ 20″; B 62° 45′ 00″
h. m.	*d.*	*d.*	*d.*	Remarks: Temp. 19° C.
8 15				Suspended torsion weight.
30				Suspended magnet.
40	39.8	41.1	40.45	
50	40.2	41.0	40.60	
9 00	40.6	41.0	40.80	
15	40.8	41.0	40.90	
30	41.2	41.4	41.30	
45	41.4	41.6	41.50	
10 00	41.6	41.8	41.70	
15	41.8	42.0	41.90	
30	41.8	41.9	41.85	
45	41.6	41.8	41.70	
11 00	41.2	41.6	41.40	Suspended torsion wt., Temp. 27°.2 C.
p. m.	Line of detorsion. °			Azimuth circle, A 242° 44′ 10″; B 62° 44′ 40″
1 15				Remarks: Temp. 27°.2 C.
30	37.8	41.6	39.7	Suspended magnet.
45	39.0	40.0	39.5	
2 00	39.2	39.6	39.4	
15	38.8	40.0	39.4	Magnet vibrating a little more than usual.
30	39.0	40.0	39.5	
45	39.4	40.2	39.7	
3 00				

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							*d.*
10	243 39 20		E	40.0	40.0	40.00		
15	29 55		I	14.8	11.2	13.00		
20	20 15	19 05	E	39.0	40.8	39.90	39.95	26.47
25	11 50	18 05	I	12.0	13.1	12.55	12.77	26.33
30	2 35	17 40	E	38.8	41.8	40.30	40.10	26.32
35	242 53 45	18 05	I	13.6	12.0	12.80	12.67	26.48
40	44 20	18 15	E	39.0	41.0	40.00	40.15	26.48
45	35 30	18 15						
50	26 30	17 50						
55	17 30	18 00						
60	8 35	17 55						
65	241 59 35	17 55						
70	50 25	18 10						
Value of one division of scale = 1′.83.			Scale reading of axis . .				.	26.42

	° ′		
Mean scale reading of east and west magnetic elongation			40.65
Reduction to axis	0 26.04	= difference =	14.23
Azimuth circle reads	152 44.54		
Magnetic meridian reads . .	153 10.58		
At beginning of a. m. observations .	. . .	A 158° 08′ 40″	
		B 338 09 10	
At end of p. m. observations . . .	. . . .	A 158 09 40	
		B 338 10 00	
Mean reading of mark	248 09.37	= 248 09 22.5	
Azimuth of mark W. of N. . . .	102 12.35		
True meridian reads	145 57.02		
Magnetic declination . .	7 13.56	E.	

Observations for declination made at Vera Cruz, Mexico, December 24, 1888, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet surpended erect.

Line of detorsion, 90°.

Local time.	Scale-readings.		Mean.	Azimuth circle, A 242° 44′ 40″; B 62 45 10
a. m.	Left.	Right.		
h. m.	d.	d.	d.	Remarks:
9 00				Suspended torsion weight.
10				Suspended magnet.
20	40.8	41.4	41.1	
30	41.0	41.4	41.2	
45	41.0	41.8	41.4	
10 00	41.2	41.8	41.5	
15	41.0	41.2	41.1	
30	40.2	41.0	40.6	Suspended torsion weight.
p. m.	Line of detorsion. °			Azimuth circle, A 242° 44′ 40″; B 62 45 20
1 53				Remarks:
15	40.0	40.8	40.4	Suspended magnet.
30	40.0	40.4	40.2	
45	39.8	40.0	39.9	
2 00	39.4	40.4	39.9	
15	39.8	40.0	39.9	
30	40.0	40.0	40.0	
45	40.0	40.2	40.1	
50	40.4	40.6	40.5	

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
10	243 40 40		E	40.0	40.0	40.00		
15	32 30		I	14.0	13.0	13.50	39.80	26.65
20	23 10	17 30	E	39.2	40.0	39.60	13.70	26.65
25	14 20	18 10	I	15.0	12.8	13.90	39.40	26.65
30	05 30	17 40	E	37.4	41.0	39.20	13.70	26.45
35	242 56 00	18 20	I	15.0	12.2	13.60	39.50	25.55
40	46 50	18 40	E	38.4	41.2	39.80		
45	37 20	18 40						
50	28 20	18 30						
55	19 20	18 00						
60	10 00	18 20						
65	00 40	18 40						
70	241 52 20	17 40						
Value of one division of scale = 1′.82.			Scale reading of axis					26.39

	° ′ ″		
Mean scale reading of east and west magnetic elongation			40.70
Reduction to axis	0 26.04	= difference =	14.31
Azimuth circle reads	152 44.97		
Magnetic meridian reads	153 11.01	° ′ ″	
At beginning of a. m. observations		A 158 10 00	
		B 338 10 40	
At end of p. m. observations		A 158 12 00	
		B 338 12 40	
Mean reading of mark	248 11.33	= 248 11 20	
Azimuth of mark W. of N.	102 12.35		
True meridian reads	145 58.98		
Magnetic declination	7 12.03	E.	

Observations for declination made at Vera Cruz, Mexico, December 25, 1888, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion 110°.

Local time.	Scale-readings.		Mean.	Azimuth circle, A 242° 44′ 40″; B 62° 45′ 10″
a. m.	Left.	Right.		
h. m.	d.	d.	d.	Remarks:
8 50				Suspended torsion weight.
9 00				Suspended magnet.
15	41.2	41.8	41.5	
30	41.8	42.0	41.9	
45	41.8	42.0	41.9	
10 00	41.6	41.8	41.7	
15	41.2	41.4	41.3	Suspended torsion weight.
p. m.	Line of detorsion °			Azimuth circle, A 242° 44′ 40″; B 62° 45′ 10″
1 00				Remarks: Suspended magnet.
15	39.8	40.8	40.3	
30	40.2	40.4	40.3	
45	40.0	40.4	40.2	
2 00	40.0	40.8	40.4	
15	40.2	41.0	40.6	

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
10	243 39 40		E	39.0	40.2	39.60		
15	31 20		I	14.5	12.0	13.20	39.65	26.43
20	21 50	17 50	E	39.2	40.2	39.70	13.40	26.55
25	12 50	18 30	I	13.0	14.2	13.60	39.60	26.60
30	03 20	18 30	E	39.0	40.0	39.50	13.50	26.50
35	242 54 20	18 30	I	13.8	13.0	13.40	39.60	26.50
40	45 00	18 20	E	39.0	40.4	39.70		
45	36 00	18 20						
50	27 00	18 00						
55	18 00	18 00						
60	09 00	18 00						
65	241 59 40	18 20						
70	50 20	18 40						
Value of one division of scale = 1′.82			Scale reading of axis . .					26.52

Mean scale reading of east and west magnetic elongation .			41.05
	° ′		
Reduction to axis	0 26.59	= difference =	14.53
Azimuth circle reads	152 44.91		
Magnetic meridian reads . . .	153 11.50	° ′ ″	
At beginning of a. m. observations .	. . .	A 158 11 00	
		B 338 11 40	
At end of p. m. observations . . .	. . . .	A 158 12 20	
		B 338 13 00	
Mean reading of mark	248 12.00	= 248 12 00	
Azimuth of mark W. of N . .	102 12.35		
True meridian reads	145 59.65		
Magnetic declination	7 11.85	E.	

Observations for dip made at Vera Cruz, Mexico, December 15, 1888, by Lieut. J. A. Norris, and December 16, 1888, by Lieut. Charles Laird, with dip circle No. 84 and needle No. 1.

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
44 31	44 18	44 05	44 03	44 43	44 40	44 16	44 23
33	18	05	01	42	38	15	22
32	18	05	02	42.5	39	15.5	22.5
44° 25′		44° 03′.5		44° 40′.7		44° 19′	
44° 14′.3				44° 29′.8			
Mean, 44° 22′.0							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
44 41	44 39	44 15	44 23	44 27	44 13	44 00	43 57
44	42	11	18	27	13	02	44 01
42.5	40.5	13	20.5	27	13	01	43 59
44° 41′.5		44° 16′.7		44° 20′		44° 00′	
Mean, 44° 19′.5							

Resulting dip, 44° 20′.9.

December 15, 1888.
Local time of beginning, 3:38 p. m.

Circle in Mag. prime vertical.

			° ′
Circle N.	Needle N.		82 02
	"	S.	81 07
Circle S.	"	N.	82 05
	"	S.	81 18
		Mean,	81 38

[Mean by polarities.]

Polarity of marked end north.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
44 00	43 59	44 28	44 13	44 19	44 16	44 46	44 43
00	58	30	18	15	23	43	49
00	58.5	29	15.5	17	19.5	44.5	46
43° 59′.2		44° 22′.2		44° 18′.3		44° 45′.2	
44° 10′.7				44° 31′.7			
Mean, 44° 21′.2							

Polarity of marked end south.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
44 24	44 23	44 36	44 33	44 06	44 03	44 21	44 06
20	28	39	35	06	00	26	11
22	25.5	37.5	34	06	01.5	23.5	08.5
44° 23′.7		44° 35′.8		44° 03′.8		44° 16′.0	
44° 29′.7				44° 09′.9			
Mean, 44° 19′.8							

Resulting dip, 44° 20′.5.

December 16, 1888.
Local time of beginning, 11:25 a. m.
Local time of ending, 1:00 p. m.

Circle in Mag. prime vertical.

			° ′
Circle N.	Needle N.		23 05
	"	S.	23 58
Circle S.	"	N.	18 14
	"	S.	19 06
		Mean,	21 05

Observations for dip made at Vera Cruz, Mexico, December 26, 1888, by Lieut. Charles Laird, with dip circle No. 84 and needle No. 1.

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
44 32	44 17	44 04	44 01	44 40	44 39	44 13	44 22
30	16	04	01	41	40	17	26
31	16.5	04	01	40.5	39.5	15	24
44° 23′.8		44° 02′.5		44° 40′		44° 19′.5	
44′ 13′.1				44° 29′.8			
Mean, 44° 21′.4							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
44 39	44 37	44 15	44 23	44 24	44 07	44 02	43 59
39	36	13	22	22	08	03	44 01
39	36.5	14	22.5	23	07.5	02.5	00
44° 37′.8		44° 18′.2		44° 15′.2		44° 01′.3	
44° 28′.0				44° 08′.3			
Mean, 44° 18′.1							

Resulting dip, 44° 19′.8

December 26, 1888.
Local time of beginning, 1:45 p. m.
Local time of ending, 4:00 p. m.

Circle in Mag. prime vertical.

			° ′
Circle N.	Needle	N.	15 46
	"	S.	15 28
Circle S.	"	N.	15 59
	"	S.	15 04
	Mean,		15 34.25

Observations for declination made at Coatzacoalcos, Mexico, February 4, 1889, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 90°.

Local time.	Scale-readings. Left.	Scale-readings. Right.	Mean.	
a. m.				Azimuth circle, A 238° 24′ 20″; B 58° 25′ 00″
h. m.	d.	d.	d.	Remarks: Suspended magnet 8:20 a. m.
8 35	38.9	40.1	39.00	
50	39.4	39.6	39.50	
9 05	39.2	39.8	39.50	
20	39.2	39.6	39.40	
35	39.0	39.4	39.20	Dismounted magnet. Suspended torsion weight.
p. m.	Line of detorsion, 40°			Azimuth circle, A 238° 24′ 20″; B 58° 24′ 40″
12 15	30.9	31.1	31.00	Remarks: Suspended magnet at 11:55 a. m.
30	30.4	31.4	30.90	
45	31.4	31.2	31.10	
1 00	30.9	31.0	30.95	
15	30.8	30.9	30.85	
30	30.7	30.9	30.80	
45	30.9	31.0	30.95	
2 00	31.0	31.0	31.00	
15	31.0	31.0	31.00	

Determination of scale value of magnet. Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Determination of axis of magnet. Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
0	239 20 30		E	40.0	40.1	40.05		
10	02 20	18 10	I	15.0	16.9	15.95	39.77	27.86
20	238 43 30	18 50	E	39.0	40.0	39.50	15.92	27.71
30	25 40	17 50	I	15.0	16.8	15.90	39.45	27.67
40	07 50	17 50	E	38.8	40.0	39.40	15.50	27.45
50	237 49 50	18 00	I	14.0	16.2	15.10	39.20	27.13
60	30 50	19 00	E	38.0	40.0	39.00		
70	13 00	17 50						
80	236 55 00	18 00						
70	237 13 00	18 00						
60	31 00	18 20						
50	49 20	18 00						
40	238 07 20	18 30						
30	25 50	18 00						
20	43 50	18 40						
10	239 02 30	17 30						
0	20 00							
Value of one division of scale = 1′.81.			Scale reading of axis					27.57

Mean scale reading of east and west magnetic elongation . .			35.15
	° ′		
Reduction to axis	0 13.72	= difference =	7.58
Azimuth circle reads	148 24.59		
Magnetic meridian reads	148 38.31	° ′ ″	
At beginning of a. m. observations .	. .	A 230 16 40	
		B 50 17 00	
At end of p. m. observations . .	. . . . . .	A 230 14 40	
		B 50 15 20	
Mean reading of mark	140 15.91	= 140 15 55	
Azimuth of mark E. of N. . . .	178 34.00		
True meridian reads	141 41.91		
Magnetic declination . . .	6 56.4	E.	

Observations for declination made at Coatzacoalcos, Mexico, February 5, 1889, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 90°.

Local time.	Scale-readings.		Mean.	
a. m.	Left.	Right.		Azimuth circle, A 238° 14′ 00″; B 58 14 40
h. m.	d.	d.	d.	Remarks:
8 35	39. 1	41. 2	40. 15	Swung magnet at 8:20.
50	39. 9	40. 8	40. 35	
9 05	40. 1	41. 0	40. 55	
20	40. 2	41. 0	40. 60	Torsion weight hung over night.
35	40. 6	41. 0	40. 80	
50	40. 8	41. 0	40. 90	
10 05	40. 8	40. 9	40. 85	
20	40. 5	40. 9	40. 70	
40	40. 2	40. 4	40. 30	
p. m.	Line of detorsion, 60°			Azimuth circle, A 238° 14′ 20″; B 58 14 40
12 30	38. 0	40. 8	39. 40	Remarks: Suspended magnet at 12.25.
45	38. 4	39. 9	39. 15	
1 00	38. 9	39. 2	39. 05	
15	39. 0	39. 4	39. 20	
30	39. 0	39. 6	39. 30	

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
0	239 25 30							
10	07 20	18 10	E	39. 9	40. 5	40. 20		
20	238 48 40	18 40	I	14. 2	16. 9	15. 55	39. 62	27. 58
30	30 10	18 30	E	38. 0	40. 1	39. 05	15. 37	27. 21
40	12 50	17 20	I	14. 5	15. 9	15. 20	39. 28	27. 24
50	237 54 40	18 10	E	39. 0	40. 0	29. 50	15. 85	27. 67
60	35 40	19 00	I	16. 0	17. 0	16. 50	39. 25	27. 87
70	18 20	17 20	E	38. 0	40. 0	39. 00		
80	236 59 40	18 40						
70	237 18 20	18 40						
60	36 20	18 00						
50	54 20	18 00						
40	238 13 00	18 40						
30	31 10	18 10						
20	49 40	18 30						
10	239 07 30	17 50						
0	25 40	18 10						
Value of one division of scale = 1′.82.			Scale reading of axis					27. 51

Mean scale reading of east and west magnetic elongation .			39. 97
	° ′		
Reduction to axis	0 22. 68	= difference =	12. 46
Azimuth circle reads	148 14. 41		
Magnetic meridian reads	148 37. 09	° ′ ″	
At beginning of a. m. observations .	. . . .	A 230 16 40	
		B 50 17 00	
At end of p. m. observations . .	. . . . .	A 230 16 00	
		B 50 16 40	
Mean reading of mark	140 16. 59	140 16 35	
Azimuth of mark E. of N. . . .	178 34. 00		
True meridian reads	141 42. 59		
Magnetic declination	6 54. 50	E.	

Observations for declination made at Coatzacoalcos, Mexico, February 6, 1889, by Lieut. Charles Laird and Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 60°.

Local time.	Scale readings.		Mean.	
a. m.	Left.	Right.		Azimuth circle, A 238° 09′ 40″; B 58 10 20
h. m.	d.	d.	d.	Remarks:
8 40	39.9	40.1	40.00	Torsion weight suspended over night.
55	40.0	40.8	40.40	Suspended magnet at 8:25.
9 10	39.9	40.0	39.95	
25	38.8	41.0	39.90	
40	38.9	40.8	39.85	
55	39.2	40.1	39.65	
10 10	39.6	39.9	39.75	
25	39.3	39.5	39.40	
40	39.0	39.6	39.30	Suspended torsion weight.
p. m.	Line of detorsion, 71°			Azimuth circle, A 238° 09′ 40″; B 58 11 20
11 50	39.4	39.8	39.60	Remarks: Suspended magnet at 11:45 a. m.
12 05	39.9	40.0	39.95	
20	39.1	40.0	39.55	
35	41.0	38.8	39.90	
50	39.1	40.4	39.75	
1 05	39.6	40.0	39.80	
20	39.9	40.0	39.95	
35	40.0	40.0	40.00	
50	39.9	40.0	39.95	
2 05	40.0	40.0	40.00	Weather rainy; north wind.

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
0	239 22 00		E	39.9	40.0	39.95		
10	04 00	18 00	I	15.8	16.0	15.90		
20	238 46 00	18 00	E	40.2	40.4	40.30	40.12	28.01
30	27 40	18 20	I	14.1	16.0	15.05	15.47	27.88
40	09 30	18 10	E	39.0	40.9	39.95	40.13	27.59
50	237 50 40	18 50	I	15.2	15.4	15.30	15.18	27.56
60	32 50	17 50	E	38.9	41.0	39.95	39.95	27.63
70	15 00	17 50						
80	236 56 40	18 20						
70	237 14 50	18 10						
60	32 50	18 00						
50	51 40	18 50						
40	238 09 50	18 10						
30	28 00	18 10						
20	46 10	18 10						
10	239 04 10	18 00						
0	22 20	18 00						
Value of one division of scale = 1′.82.			Scale reading of axis . . .					27.73

Mean scale reading of east and west magnetic elongation			39.87
Reduction to axis	0° 22′.09	= difference =	12.14
Azimuth circle reads . .	148 10.00		
Magnetic meridian reads .	148 32.09		
At beginning of a. m. observations	. .	A 230° 15′ 20″	
		B 50 16 00	
At end of p. m. observations	. . . . .	A 230 15 00	
		B 50 15 20	
Mean reading of mark .	140 15.41	= 140 15 25	
Azimuth of mark E. of N	178 34.00		
True meridian reads . . .	141 41.41		
Magnetic declination . . .	6 50.68	E.	

Observations for declination made at Coatzacoalcos, Mexico, February 7, 1889, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion 60°.

Local time.	Scale readings.		Mean.	Azimuth circle, A 238° 11′ 00″ B 58 11 40
a. m.	Left.	Right.		
h. m.	d.	d.	d.	Remarks:
8 35	38.9	41.0	39.95	Torsion weight suspended over night.
50	39.6	40.4	40.00	At 8:25 suspended magnet.
9 05	40.0	40.1	40.05	
20	40.1	40.2	40.15	
35	40.1	40.2	40.15	
50	40.1	40.3	40.20	
10 05	40.1	40.6	40.35	
20	40.1	40.4	40.25	
35	40.1	40.2	40.15	
50	39.9	40.1	40.00	Suspended torsion weight.
p. m.	Line of detorsion 30°			Azimuth circle, A 238° 10′ 40″ B 58 11 40
12 10	38.9	41.1	40.00	Remarks: Suspended magnet at 12 m.
25	39.8	40.0	39.90	
40	39.6	40.0	39.80	
55	39.6	39.8	39.70	
1 10	39.2	39.6	39.40	
25	39.0	39.3	39.15	
40	39.0	40.0	39.45	
55	39.3	40.2	39.75	
2 10	40.0	40.5	40.25	

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
0	239 24 30							
10	06 40	17 50	E	40.0	40.0	40.00		
20	238 48 40	18 00	I	15.0	15.9	15.50	40.00	27.75
30	30 40	18 00	E	39.1	40.9	40.00	15.72	27.86
40	12 30	18 10	I	15.9	16.0	15.95	38.75	27.35
50	237 53 50	18 40	E	37.0	38.0	37.50	17.08	27.29
60	35 40	18 10	I	17.6	18.8	18.20	37.65	27.93
70	17 30	18 10	E	37.2	38.4	37.80		
80	236 58 50	18 40						
70	237 17 20	18 30						
60	35 40	18 20						
50	54 00	18 20						
40	238 12 30	18 30						
30	30 30	18 00						
20	48 40	18 10						
10	239 07 00	18 20						
0	24 40	17 40						
Value of one division of scale = 1′.82.			Scale reading of axis					27.63

Mean scale reading of east and west magnetic elongation . . .			39.75
	° ′		
Raduction to axis	0 22.06	= difference =	12.12
Azimuth circle reads	148 11.25		
Magnetic meridian reads . .	148 33.31	° ′ ″	
At beginning of a. m. observations .	. . . . . .	A 230 15 20	
		B 50 16 00	
At end of p. m. observations .	. . . .	A 230 15 40	
		B 50 16 40	
Mean reading of mark	140 15.91	= 140 15 55	
Azimuth of mark E. of N .	178 34.00		
True meridian reads . . .	141 41.91		
Magnetic declination	6 51.40	E.	

Observations for dip made at Coatzacoalcos, Mexico, February 8 and 9, 1889, by Lieut. Charles Laird, with dip circle No. 84 and needle No. 1.

[Mean by polarities.]

Polarity of marked end north.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
42 24	42 26	43 10	42 58	43 01	43 04	43 25	43 21
32	33	13	43 04	05	00	31	25
28	29.5	11.5	01	03	02	28	23
42° 28′.7		43° 06′.2		43° 02′.5		43° 25′.5	
42°47′.4				45° 14′			
Mean, 43° 00′.7							

Polarity of marked end south.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
43 05	43 11	43 18	43 12	42 58	42 58	43 13	43 02
07	11	08	16	59	43 00	12	03
06	11	13	14	58.5	59	12.5	02.5
43° 08′.5		43° 13′.5		42° 58′.7		43° 07′.5	
43° 11′				43° 03′			
Mean, 43° 0′.7							

Resulting dip, 43° 03°.8.

February 8, 1889.
Local time of beginning, 9:00 a. m.
Local time of ending, 10:25 a. m.

Circle in Mag. prime vertical.		
		° ′
Circle N.	Needle N.	43 26
	" S.	
Circle S.	" N.	43 39
	" S.	44 23
	Mean,	43 49.3

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
43 08	42 58	42 47	42 47	43 26	43 10	43 13	43 18
07	57	44	45	19	15	09	. 13
07.5	57.5	45.5	46	22.5	12.5	11	15.5
43° 02′.5		42° 45′.7		43° 17′.5		43° 13′.2	
42° 54′.1				43° 15.′3			
Mean, 43° 04′.7							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
43 22	43 28	42 58	43 03	43 11	43 06	42 43	42 44
27	21	56	01	12	04	47	47
29.5	24.5	57	02	11.5	05	45	45.5
43° 17′		42° 59′.5		43° 08′.2		42° 45′.3	
43° 08′.3				42° 56′.7			
Mean, 43° 02′.5							

Resulting dip, 43° 03′.6.

Local time of beginning, 9:30 a. m.
Local time of ending, 10:40 a. m.
Magnetic meridian reads ° ′ 43 55

Circle in Mag. prime vertical.		
		° ′
Circle N.	Needle N.	44 05
	" S.	43 38
Circle S.	" N.	44 17
	" S.	43 40
	Mean,	43 55

Observations for dip made at Coatzacoalcos, Mexico, February 10 and 11, 1889, by Ensign J. H. L. Holcombe, with dip circle No. 84 and needle No. 1.

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
43 06	42 52	42 50	42 50	43 22	43 22	42 59	43 09
05	52	51	51	20	21	59	10
05.5	52	50.5	50.5	21	21.5	59	09.5
42° 58′.8		42 50′.5		43° 21′.3		43° 04′.2	
42° 54′.6				43° 12′.7			
Mean, 43° 03′.7.							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
43 20	43 21	42 52	43 02	43 12	42 59	42 53	42 50
20	20	51	02	10	57	50	48
20	20.5	51.5	02	11	58	51.5	49
43° 20′.2		42° 56′.7		43° 04′.5		42° 50′.2	
43° 08.′5				42° 57′.3			
Mean, 43° 02′.9.							

Resulting dip, 43° 03′.3.

February 10, 1889.
Local time of beginning, 1:20 p. m.
Local time of ending, 2:20 p. m.

Circle in Mag. prime vertical.			
			° ′
Circle N.	Needle	N.	44 05
	"	S.	43 34
Circle S.	"	N.	44 17
	"	S.	43 50
		Mean,	43 57

[Mean by polarities.]

Polarity of marked end north.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
42 40	42 46	43 04	42 48	42 57	43 06	43 19	43 20
45	42	04	48	54	03	18	20
42.5	44	04	48	55.5	04.5	18.5	20
42° 43′.2		42° 56′		43° 00′		43° 19′.3	
42° 49′.6				43° 09′.6			
Mean, 42° 59′.7							

Polarity of marked end south.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
43 00	43 11	43 21	43 20	42 53	42 52	43 15	43 00
02	12	22	21	53	52	15	00
01	11.5	21.5	20.5	53	52	15	00
43° 06′.3		43° 21′.0		42° 52′.5		43° 07′.5	
43° 13′.6				43′ 00′			
Mean, 43° 06′.8							

Resulting dip, 43° 03′.2

February 11, 1889.
Local time of beginning, 12:35 p. m.
Local time of ending, 1:20 p. m.

Circle in Mag. prime vertical.			
			° ′
Circle N.	Needle	N.	43 43
	"	S.	44 10
Circle S.	"	N.	43 36
	"	S.	44 21
		Mean,	43 57

Observations for dip made at Coatzacoalcos, Mexico, February 12, 1889, by Ensign J. H. L. Holcombe, with dip circle No. 84 and needle No. 1.

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
43 12	42 59	42 45	42 41	43 22	43 20	43 01	43 11
13	43 00	47	45	24	25	00	11
12.5	42 59.5	46	43	23	22.5	00.5	11
43° 06′		42° 44′.5		43 22′.7		43 05′.7	
42′ 55′.2				43° 14′.2			
Mean, 43° 04′.7							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
43 23	43 24	42 52	43 00	43 14	43 00	42 35	42 32
23	24	53	02	14	42 59	35	33
23	24	52.5	01	43.14	59.5	35	32.5
43° 23′.5		42 56′.7		43° 06′.7		42° 33′.8	
43° 10′.1				42 50′.2			
Mean, 43° 00′.2							

Resulting dip, 43° 02′.5

February 12, 1889.
Local time of beginning, 10:20 a. m.
Local time of ending, 11:10 a. m.

Circle in Mag. prime vertical.

			° ′
Circle N.	Needle	N.	44 06
	"	S.	43 21
Circle S.	"	N.	44 25
	"	S.	43 44
		Mean,	43 54

Observation for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at Coatzacoalcos, Mexico, February 8 and 10, 1889, by Ensign J. H. L. Holcombe, long magnet deflecting at right angles to short magnet suspended.

Distance $r = 0^m.440$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	61 57 00	56 40	56 50				
	W.					2	56 06 20	6 20	6 20
	E.	3	56 40	56 20	56 30				
	W.					4	06 40	6 20	6 30
	E.	5	62 06 20	7 00	6 10				
	Mean,		61° 59′ 50″				56° 06′ 25″		
West.	W.					6	56 13 40	13 40	13 40
	E.	7	62 03 00	3 00	3 00				
	W.					8	13 40	14 00	13 50
	E.	9	61 59 20	59 00	59 10				
	W.					10	14 40	14 20	14 30
	Mean,		62° 01′ 05″				56° 14′ 00″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} \text{------}\right)$

		Logarithms.
Magnet east, $2u = 5° 53'.41$		
Magnet west, $2u = 5\ 47.08$	$\frac{1}{2} r^3$	8.62822
Mean, $5\ 50.33$	Sin u	8.70743
$u = 2\ 55.12$		
Time of beginning, 1:15 — Temp., 24.0° C.	$1 - \frac{P}{r^2}$	0.00749
Time of ending, 2:20 — Temp., 25.5	temp., etc.	0.00411
Mean, 1:47 — $t = 24.7$	$\frac{m}{H}$	7.34725

Distance $r = 0^m.465$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	62 32 20	32 20	32 20				
	W.					2	57 35 20	35 40	35 30
	E.	3	32 20	32 20	32 20				
	W.					4	35 20	35 20	35 20
	E.	5	32 20	32 20	32 20				
	Mean,		62° 32′ 20″				57° 35′ 25″		
West.	W.					6	57 34 00	34 20	34 10
	E.	7	62 29 00	29 20	29 10				
	W.					8	33 40	34 00	
	E.	9	29 20	29 00	29 10				
	W.					10	34 00	34 00	
	Mean,		62° 29′ 10″				57° 34′ 00″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} \text{------}\right)$

		Logarithms.
Magnet east, $2u = 4° 56'.91$		
Magnet west, $2u = 4\ 55.17$	$\frac{1}{2} r^3$	8.70194
Mean, $4\ 56.04$	Sin u	8.63390
$u = 2\ 28.02$		
Time of beginning, 8:34 — Temp., 24.5° C.	$1 - \frac{P}{r^2}$	0.00437
Time of ending, 9:20 — Temp., 25.6	temp., etc.	0.00419
Mean, 8:57 — $t = 25.0$	$\frac{m}{H}$	7.34440

Observations for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at Coatzacoalcos, Mexico, February 11 and 12, 1889, by Ensign J. H. L. Holcombe, long magnet deflecting at right angles to short magnet suspended.

Distance $r = 0^m.380$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	64 35 40	36 00	35 50				
	W.					2	55 29 40	29 40	29 40
	E.	3	34 40	35 00	34 50				
	W.					4	29 00	29 20	29 10
	E.	5	34 40	35 00	34 50				
	Mean.		64° 35′ 10″				55° 29′ 25″		
West.	W.					6	55 26 40	26 40	26 40
	E.	7	64 27 20	27 20	27 20				
	W.					8	26 00	26 20	26 10
	E.	9	26 20	26 40	26 30				
	W.					10	26 20	26 40	26 30
	Mean,		64° 26′ 55″				55° 26′ 27″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \, (1 - \frac{P}{r^2} \ldots\ldots)$

			Logarithms.
Magnet east, $2u$ = 9° 05′.75			
Magnet west, $2u$ = 9 00.47		$\frac{1}{2} r^3$	8.43589
Mean, 9 03.11		Sin u	8.89712
u = 4 31.55		$1 - \frac{P}{r^2}$	0.01037
Time of beginning, 9:45	Temp., 25°.0 C.	temp., etc.	0.00428
Time of ending, 10:45	Temp., 25.7		
Mean, 10:15	t = 25.4	$\frac{m}{H}$	7.34766

Distance $r = 0^m.385$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	64 25 00	25 00	25 00				
	W.					2	55 42 20	42 20	42 20
	E.	3	24 40	24 40	24 40				
	W.					4	42 20	42 40	42 30
	E.	5	24 40	24 40	24 40				
	Mean,		64° 24′ 47″				55° 42′ 25″		
West.	W.					6	57 38 40	39 00	38 50
	E.	7	64 19 40	19 40	19 40				
	W.					8	38 40	39 00	38 50
	E.	9	19 20	19 20	19 20				
	W.					10	39 00	39 20	39 10
	Mean,		64° 19′ 30″				55° 38′ 57″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \, (1 - \frac{P}{r^2} \ldots\ldots)$

			Logarithms.
Magnet east, $2u$ = 8° 42′.37			
Magnet west, $2u$ = 8 40.55		$\frac{1}{2} r^3$	8.45339
Mean, 8 41.46		Sin u	8.87950
u = 4 20.73		$1 - \frac{P}{r^2}$	0.00636
Time of beginning, 12:15	Temp., 30° C.	temp., etc.	0.00516
Time of ending, 12:55	Temp., 30.8		
Mean, 12:35	t = 30.4	$\frac{m}{H}$	7.34441

Observations of vibration, made at Coatzacoalcos, Mexico, February 8, 1889, by Ensign J. H. L. Holcombe.

	Civil time, a. m.	Temp. of magnet.	Hor. force magnetometer.	Hor. force thermometer.
	h. m.	°		
At commencement	3 20	73.4 F.		
At end	3 45	73.2		
Means	. . . .	73.3		
Corrected means .				

Scale moving apparently—						Torsion force.		
To the right.			To the left.					
No. of Vib.	Time of passing wire.	Time of 180 Vib's.	No. of Vib.	Time of passing wire.	Time of 180 Vib's.	Torsion.	Scale divisions.	Means and differences.
	h. m. s.	*m. s.*		*h. m. s.*	*m. s.*			
0	9 39 55.0		9	9 40 25.0		0	40.00	
180	49 56.7	10 1.7	189	50 26.7	10 1.7	+ 90	41.55	
18	40 55.0		27	41 25.1		0	40.50	For 90°.
198	50 57.0	10 2.0	207	51 27.0	10 1.9	− 90	39.40	
36	41 55.3		45	42 25.4		0	40.00	
216	51 57.1	10 1.8	225	52 27.1	10 1.7	+360	44.50	For 360°.
54	42 55.5		63	43 25.5		0	40.10	For 90°.
234	52 57.3	10 1.8	243	53 27.3	10 1.8	−360	36.00	Adopted effect 90°.
72	43 55.7		81	44 25.7		0	40.30	Torsion 1.10 Sc.Div.
252	53 57.4	10 1.7	261	54 27.5	10 1.8	$v = 1'.98$		1 Sc. Div. = 1′.8.
90	44 55.7		99	45 25.9		$1+\frac{h}{F}=1.00037$		
270	54 57.7	10 2.0	279	55 27.7	10 1.8			
90 / 0	5 0.7		99 / 9	5 0.9		Vertical scale, 18.6		
Time for 180th.	49 56.4		Time for 189th.	50 26.8				
Mean		10 1.83	Time, 90 Vib.		10.178			
Mean time—180 vib's		$601^s.80$	Time, 1 Vib.	$=T_0=$	$3^s.343$			

Observations of vibration, made at Coatzacoalcos, Mexico, February 9, 1889, by Ensign J. H. L. Holcombe.

Chro. error, Daily rate, $+2^{s}.234$.

	Civil time.	Temp. of magnet.	Hor. force magnetometer.	Hor. force thermometer.
	h. m.	°		
At commencement .	2 30	27.5 C.		
At end . .	3 05	30.4		
Means		28.95		
Corrected means .	. . .	28.7		

Scale moving apparently—						Torsion force.		
To the right.			To the left.					
No. of Vib.	Time of passing wire.	Time of 180 Vib's.	No. of Vib.	Time of passing wire.	Time of 180 Vib's.	Torsion.	Scale divisions.	Means and differences.
	h. m. s.	*m. s.*		*h. m. s.*	*m. s.*			
0	9 11 08.0		9	9 11 38.2		0	40.10	
180	21 10.5	10 2.5	189	21 40.7	10 2.5	+ 90	41.30	
18	12 08.2		27	12 38.3		0	40.10	For 90°.
198	22 10.7	10 2.5	207	22 40.9	10 2.6	— 90	38.95	
36	13 08.4		45	13 38.5		0	40.05	
216	23 11.0	10 2.6	225	23 41.2	10 2.7	+360	44.90	For 360°.
54	14 08.5		63	14 39.0		0	40.50	For 90°.
234	24 11.2	10 2.7	243	24 41.5	10 2.5	—360	37.00	Adopted effect 90°.
72	15 09.0		81	15 39.2		0	40.10	Torsion 1.03 Sc Div.
252	25 11.7	10 2.7	261	25 41.9	10 2.7	$v = 1'.85$		1 Sc. Div. $= 1'.8$
90	16 09.3		99	16 39.5				
270	26 12.1	10 2.8	279	26 42.2	10 2.7	$1 + \frac{h}{F} = 1.00034$		
90 0 Time for 180th.			99 9 Time for 180th.			Vertical scale, 16		
Mean		10 2.63	Time, 90 Vib.		10 02.61			
Mean time—180 Vib's		$602^{s}.62$	Time, 1 Vib.	$= T_0 =$	$3^{s}.348$			

Observations of vibration, made at Coatzacoalcos, Mexico, February 10, 1889, by Ensign J. H. L. Holcombe.

Chro error. Daily rate, $+2^s.234$.

	Civil time.	Temp. of magnet.	Hor. force magnetometer.	Hor. force thermometer.
	h. m.	°		
At commencement	3 35	26.3 C.		
At end	4 12	26.2		
Means		26.25		
Corrected means		25.9		

Scale moving apparently—						Torsion force.		
To the right.			To the left.					
No. of Vib.	Time of passing wire.	Time of 180 Vib's.	No. of Vib.	Time of passing wire.	Time of 180 Vib's.	Torsion.	Scale divisions.	Means and differences.
	h. m. s.	*m. s.*		*h. m. s.*	*m. s.*			
0	10 17 36.2		9	10 18 06.5		0	40.05	
180	27 38.5	10 2.3	189	28 08.4	10 1.9	+ 90	41.00	
18	18 36.4		27	19 06.7		0	40.00	For 90°
198	28 38.7	10 2.3	207	29 08.7	10 2.0	− 90	39.00	
36	19 36.7		45	20 06.8		0	39.90	
216	29 39.0	10 2.3	225	30 09.1	10 2.3	+360	44.75	For 360°
54	20 36.8		63	21 07.1		0	40.00	For 90°
234	30 39.3	10 2.5	243	31 09.2	10 2.1	−360	35.50	Adopted effect 90°
72	21.37.2		81	22 07.2		0	40.15	Torsion 1.13 Sc.Div.
252	31 39.5	10 2.3	261	32 09.4	10 2.2	$v = 2'.03$		1 Sc. Div. = 1′ 8
90	22 37.3		99	23 07.4		$1+\frac{h}{F} = 1.00037$		
270	32 39.7	10 2.4	279	33 09.5	10 2.1			
90 0 Time for 180th.			99 9 Time for 189th.			Vertical scale, 24.0		
Mean,		10 2.35	Time, 90 Vib.		10 2.10			
Mean time—180 Vib's		$602^s.225$	Time, 1 Vib.	$= T_0 =$	$3^s.346$			

Observations for declination made at Salina Cruz, Mexico, March 21, 1889, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 180°.

Local time.	Scale readings. Left.	Right.	Mean.	
a. m.				Azimuth circle, A 248° 37′ 20″; B 68 37 40
h. m.	d.	d.	d.	Remarks:
8 35	40.0	40.0	40.00	Suspended torsion weight at 7:40.
8 50	40.0	40.1	40.05	Suspended magnet at 8:20.
9 05	40.1	40.2	40.15	
9 20	40.2	40.4	40.30	
9 35	40.8	41.0	40.90	
9 50	40.9	41.1	41.00	
10 05	40.8	41.0	40.90	
10 20	40.8	41.0	40.90	
10 35	40.8	40.9	40.85	
10 50	40.6	40.8	40.70	
11 05	40.5	40.8	40.65	
11 20	40.4	40.5	40.45	Suspended torsion weight.
p. m.	Line of detorsion, 200°			Azimuth circle, A 248° 37′ 00″; B 68 37 40
1 00	38.0	38.4	38.20	Remarks:
1 15	38.0	38.2	38.10	Suspended magnet at 12:50.
1 30	38.0	38.2	38.10	Change in overhead scale of 11 div.
1 45	38.1	38.2	38.15	In morning read with horizontal
2 00	38.5	38.9	38.70	wire at 10 d., now at 21.

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
0	249 47 40		E	39.9	40.1	40.00		
10	29 30	18 10	I	15.9	16.1	16.00	40.25	28.12
20	09 50	19 40	E	39.8	41.2	40.50	16.45	28.47
30	248 52 50	17 00	I	16.8	17.0	16.90	40.20	28.55
40	34 40	18 10	E	39.8	40.0	39.90	16.55	28.28
50	16 20	18 20	I	15.2	17.2	16.20	40.00	28.10
60	247 58 30	17 50	E	39.8	40.4	40.10		
70	39 40	18 50						
80	21 40	18 00						
70	39 50	18 10						
60	58 40	18 50						
50	248 17 00	18 20						
40	35 00	18 00						
30	53 10	18 10						
20	249 11 40	18 30						
10	30 00	18 20						
0	47 40	17 40						
Value of one division of scale = 1′.82.			Scale reading of axis					28.29

Mean scale reading of east and west magnetic elongation . . .			39.55
	° ′		
Reduction to axis	0 20.49	= difference =	11.26
Azimuth circle reads	158 37.48		
Magnetic meridian reads . . .	158 57.97	° ′ ″	
At beginning of a. m. observations .	. . . . .	A 54 58 20	
		B 234 58 40	
At end of p. m. observations . . .	. . . . . .	A 54 59 20	
		B 234 59 40	
Mean reading of mark	144 59.00	= 144 59 00	
Azimuth of mark, W. of N. . .	7 00.12		
True meridian reads	151 59.12		
Magnetic declination . . .	6 58.85	E.	

Observations for declination made at Salina Cruz, Mexico, March 22, 1889, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer, No. 54, with long magnet suspended erect.

Line of detorsion 200°.

Local time.	Scale reading.		Mean.	Azimuth circle, A 248° 33′ 00″; B 68° 34′ 00″
a. m.	Left.	Right.		
h. m.	d.	d.	d.	Remarks:
9 25	40. 0	40. 2	40. 10	At 9:10, suspended torsion weight.
40	40. 8	41. 0	40. 90	At 9:20, suspended magnet.
55	40. 9	41. 1	41. 00	
10 10	41. 1	41. 4	41. 25	
25	41. 1	41. 2	41. 15	
40	41. 1	41. 1	41. 10	Suspended torsion weight.
p. m.	Line of detorsion, 196°			Azimuth circle, A 248° 33′ 00″; B 68° 34′ 00″
12 00	40. 8	41. 5	41. 15	Remarks:
30	41. 1	41. 3	41. 20	Suspended magnet at 11:50.
45	41. 2	41. 6	41. 40	
1 00	41. 5	41. 7	41. 60	
15	41. 4	41. 6	41. 50	
30	41. 3	41. 5	41. 40	
45	41. 6	41. 8	41. 70	
2 00	41. 7	41. 9	41. 80	
15	41. 9	42. 0	41. 95	
30	42. 0	42. 1	42. 05	

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean	Axis.
	° ′ ″							d.
0	249 50 10		E	40. 0	40. 0	40. 00		
10	32 10	18 00	I	15. 0	15. 8	15. 40	40. 25	27. 83
20	13 40	18 30	E	40. 0	41. 0	40. 50	15. 25	27. 37
30	248 55 40	18 00	I	15. 0	15. 2	15. 10	40. 40	27. 75
40	46 10	18 30	E	40. 0	40. 6	40. 30	15. 00	27. 65
50	18 50	17 20	I	14. 8	15. 0	14. 90	40. 00	27. 45
60	00 30	18 20	E	39. 2	40. 2	39. 70		
70	247 42 20	18 10						
80	24 20	18 00						
70	42 20	18 00						
60	248 00 20	18 00						
50	18 50	18 30						
40	46 50	18 00						
30	55 20	18 30						
20	249 13 30	18 10						
10	31 50	18 20						
0	50 00	18 10						
Value of one division of scale = 1′. 815.			Scale reading of axis					27. 61

Mean scale reading of east and west magnetic elongation			41. 07
	° ′		
Reduction to axis	0 24. 42	= difference =	13. 46
Azimuth circle reads	158 33. 50		
Magnetic meridian reads	158 57. 92	° ′ ″	
At beginning of a. m. observations		A 54 58 20	
		B 234 58 20	
At end of p. m. observations		A 54 57 40	
		B 234 58 20	
Mean reading of mark	144 58. 17	= 144 58 10	
Azimuth of mark W. of N	7 00. 12		
True meridian reads	151 58. 29		
Magnetic declination	6 59. 63	E.	

Observations for declination made at Salina Cruz, Mexico, March 23, 1889, by Ensign J. H. L. Holcombe, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 246°.

Local time.	Scale readings.		Mean.	
a. m.	Left.	Right.		Azimuth circle, A 248° 34′ 20″; B 68° 35′ 20″
h. m.	d.	d.	d.	Remarks:
9 40	39.8	40.2	40.00	Suspended torsion weight at 9:10.
55	40.2	40.6	40.40	Suspended magnet at 9:30.
10 10	40.8	40.9	40.85	
25	41.0	41.0	41.00	
40	40.9	41.0	40.95	
55	41.0	41.0	41.00	
11 10	41.0	41.0	41.00	
25	41.0	41.2	41.10	
40	41.2	41.5	41.35	
p. m.	Line of detorsion, 246°			Azimuth circle, A 248° 34′ 20″; B 68° 35′ 20″
12 20	41.4	41.6	41.50	Remarks: Observations continuous; magnet not dismounted.
35	41.6	41.8	41.70	
40	41.7	41.8	41.75	
1 05	41.5	41.6	41.55	
20	41.5	41.6	41.55	
35	41.8	41.9	41.85	
50	41.8	41.9	41.85	
2 05	42.0	42.0	42.00	
20	42.0	42.0	42.00	
35	42.0	42.1	42.05	
50	42.2	42.4	42.30	
3 05	42.6	42.9	42.75	
20	42.9	43.0	42.95	
35	42.9	43.0	42.95	
50	43.0	43.0	43.00	

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
0	249 52 10		E	40.0	40.1	40.05		
10	34 20	17 50	I	15.0	15.1	15.05	39.70	27.38
20	15 50	18 30	E	38.9	39.8	39.35	15.50	27.42
30	248 57 20	18 30	I	15.9	16.0	15.95	39.15	27.55
40	39 30	17 50	E	38.9	39.0	38.95	15.95	27.45
50	21 20	18 10	I	15.9	16.0	15.95	39.42	27.68
60	02 50	18 30	E	39.8	40.0	39.90		
70	247 44 20	18 30						
80	26 20	18 00						
70	44 30	18 10						
60	248 02 30	18 00						
50	21 00	18 30						
40	39 30	18 30						
30	57 20	17 50						
20	15 30	18 10						
10	34 20	18 50						
0	249 51 20	17 00						
Value of one division of scale = 1′.82.			Scale reading of axis					27 50

Mean scale reading of east and west magnetic elongation			41 50
	° ′		
Reduction to axis	0 25.49	= difference =	14 00
Azimuth circle reads	158 34.83		
Magnetic meridian reads . .	159 00.32		
		° ′ ″	
At beginning of a. m. observations .	. . . .	A 54 57 20	
		B 234 58 00	
At end of p. m. observations . . .	. . . . .	A 54 58 20	
		B 234 58 00	
Mean reading of mark	144 57.95	= 144 57 55	
Azimuth of mark W. of N. .	7 00.12		
True meridian reads	151 58.03		
Magnetic declination . .	7 02.29	E.	

Observations for declination made at Salina Cruz, Mexico, March 24, 1889, by Lieut. Charles Laird, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 260°.

Local time.	Scale readings. Left.	Right.	Mean.
a. m.			
h. m.	d.	d.	d.
9 25	39.5	40.0	39.75
40	40.0	40.1	40.05
55	40.1	40.3	40.20
10 10	40.5	40.7	40.60
25	40.8	40.9	40.85
40	41.0	41.0	41.00
55	41.0	41.0	41.00
11 10	41.0	41.1	41.05
25	41.1	41.2	41.15
40	41.8	42.0	41.90
55	42.0	42.0	42.00

Azimuth circle, A 248° 31′ 40″
B 68 32 20

Remarks:
Suspended torsion weight at 9, magnet at 9:10.
Clear pleasant weather, northerly wind.

p. m.	Line of detorsion °		
12 10	42.0	42.1	42.05
25	42.1	42.3	42.20
40	42.2	42.4	42.30
50	42.4	42.5	42.45
1 10	42.5	42.7	42.60
25	42.5	42.6	42.55
40	42.5	42.7	42.60
55	42.5	42.7	42.60
2 10	42.7	42.9	42.80
25	42.8	42.9	42.85
40	42.9	43.0	42.95
55	43.0	43.0	43.00
3 10	43.1	43.4	43.25
25	43.1	43.2	43.15
40	43.0	43.1	43.05

Azimuth circle, A 248° 31′ 40″
B 68 32 20

Remarks:
Observations continuous, azimuth circle same, line of detorsion same as in a. m. observations.

Determination of scale value of magnet. Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Determination of axis of magnet. Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
0	249 50 10		E	40.0	40.1	40.05		
10	32 20	17 50	I	15.5	16.0	15.75	40.02	27.88
20	14 00	18 20	E	40.0	40.0	40.00	15.95	27 97
30	248 56 00	18 00	I	16.0	16.3	16.15	39.95	28.05
40	37 40	18 20	E	40.0	39.8	39.90	16.37	28.03
50	19 20	18 20	I	16.4	16.8	16.60	39.97	28.28
60	1 00	18 20	E	40.0	40.1	40.05		
70	247 42 30	18 30						
80	24 40	17 50						
70	42 50	18 10						
60	01 10	18 20						
50	19 20	18 10						
40	37 50	18 30						
30	56 10	18 20						
20	14 20	18 10						
10	32 30	18 10						
0	50 20	17 50						

Value of one division of scale = 1′.82.

Scale reading of axis			28.06
Mean scale reading of east and west magnetic elongation . .			41.40
	° ′		
Reduction to axis	0 24.28	= difference =	13.34
Azimuth circle reads . .	158 32.00		
Magnetic meridian reads .	158 56.28	° ′ ″	
At beginning of a. m. observations .	. .	A 54 57 00	
		B 234 57 20	
At end of p. m. observations .	. . . . .	A 54 58 20	
		B 234 58 20	
Mean reading of mark .	144 57.75	= 144 57 45	
Azimuth of mark W. of N. .	7 00.12		
True meridian reads	151 58.87		
Magnetic declination .	6 58.41	E.	

Observations for dip made at Salina Cruz, Mexico, March 17 and 18, 1889, by Ensign J. H. L. Holcombe, with dip circle No. 84 and needle No. 1.

[Mean by polarities.]

Polarity of marked end north.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
39 47	39 46	40 10	39 58	39 58	40 04	40 12	40 12
51	50	08	55	40 00	07	17	17
49	48	09	56.5	39 59	05.5	14.5	14.5
39° 48′.5		40° 02′.7		40° 02′.2		40° 14′.5	
39° 55′.6				40° 08′.3			
Mean, 40° 01′.45							

Polarity of marked end south.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
40 01	40 10	40 01	40 02	39 43	39 40	40 13	40 00
05	13	10	13	45	41	13	39 59
03	11.5	05.5	07.5	44	40.5	13	59.5
40° 07′.2		40° 06′.5		39° 42′.3		40° 06′.2	
40° 06′.8				39° 54′.2			
Mean, 40° 0′.5							

Resulting dip, 40° 0′.97.

March 17, 1889.
Local time of beginning, 2:15.
Local time of ending, 2:40.

Circle in Mag. prime vertical.			
			° ′
Circle N.	Needle	N.	48 20
	"	S.	47 51
Circle S.	"	N.	48 07
	"	S.	48 36
		Mean,	48 13.5

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
40 04	39 50	39 40	39 38	40 28	40 29	39 58	40 09
02	48	37	35	28	29	58	09
03	49	38.5	36.5	28	29	58	09
39° 56′		39° 37′.5		40° 28′.5		40° 03′.5	
39° 46′.7				40° 16′			
Mean, 40° 01′.3							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
40 22	40 22	39 45	39 54	40 04	39 52	39 39	39 38
20	20	49	58	10	56	41	40
21	21	47	56	07	54	40	39
40° 21′		39° 51′.5		40° 00′.5		39° 39′.5	
40° 06′.3				39° 50′			
Mean, 39° 58′.1							

Resulting dip, 39° 59′.7

March 18, 1889.
Local time of beginning, 1:30
Local time of ending, 2:30

Circle in Mag. prime vertical.			
			° ′
Circle N.	Needle	N.	48 23
	"	S.	47 46
Circle S.	"	N.	48 00
	"	S.	48 43
		Mean,	48 13

Observations for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at Salina Cruz, Mexico, March 18 and 19, 1889, by Ensign J. H. L. Holcombe, long magnet deflecting at right angles to short magnet suspended.

Distance $r = 0^m.355$.

Magnet.	North end.	No.	Circle readings. A.	B.	Mean.	No.	Circle readings. A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	76 30 00	29 40	29 50				
	W.					2	65 28 00	28 00	28 00
	E.	3	29 40	29 20	29 30				
	W.					4	28 20	28 20	28 20
	E.	5	30 20	30 20	30 20				
	Mean,		76° 29′ 53″				65° 28′ 10″		
West.	W.					6	65 23 40	23 40	23 40
	E.	7	76 20 40	20 40	20 40				
	W.					8	23 20	23 40	23 30
	E.	9	20 40	20 20	20 30				
	W.					10	23 40	23 40	23 40
	Mean,		76° 20′ 35″				65° 23′ 37″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} \text{------}\right)$

			Logarithms.
Magnet east, $2u =$ 11° 01′.71		$\frac{1}{2}r^3$	8.34902
Magnet west, $2u =$ 10 56.91		Sin u	8.98113
Mean, 10 59.31		$1 - \frac{P}{r^2}$	9.99851
$u =$ 5 29.66			
Time of beginning, 3:30	Temp., 29°.5	temp., etc.	0.00502
Time of ending, 4:10	Temp., 29.5		
Mean, 3:50	$t =$ 29.5	$\frac{m}{H}$	7.33368

Distance $r = 0^m 325$.

Magnet.	North end.	No.	Circle readings. A.	B.	Mean.	No.	Circle readings. A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	78 17 40	17 40	17 40				
	W.					2	63 55 20	55 40	55 30
	E.	3	17 40	17 40	17 40				
	W.					4	55 00	55 00	55 00
	E.	5	17 00	17 00	17 00				
	Mean,		78° 17′ 27″				63° 55′ 15″		
West.	W.					6	63 47 20	47 40	47 30
	E.	7	78 04 20	04 40	4 30				
	W.					8	47 00	47 00	47 00
	E.	9	05 00	04 40	4 50				
	W.					10	47 20	47 00	47 10
	Mean,		78° 04′ 40″				63° 47′ 13″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} \text{------}\right)$

			Logarithms.
Magnet east, $2u =$ 14° 22′.20		$\frac{1}{2}r^3$	8.23130
Magnet west, $2u =$ 14 17.45		Sin u	9.09597
Mean, 14 19.82		$1 - \frac{P}{r^2}$	0.00282
$u =$ 7 09.91			
Time of beginning, 9:50	Temp., 34°.0	temp., etc.	0.00587
Time of ending, 10:30	Temp., 34.0		
Mean, 10:12	$t =$ 34.0	$\frac{m}{H}$	7.33596

Observations for dip made at Salina Cruz, Mexico, March 16 and 19, 1889, by Ensign J. H. L. Holcombe, with dip circle No. 84 and needle No. 1.

[Mean by polarities.]

Polarity of marked end north.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
39 34	39 35	40 08	39 56	39 52	40 00	40 05	40 05
36	37	11	40 00	50	39 59	15	14
35	36	09.5	39 58	51	59.5	10	09.5
39° 35′.5		40° 03′.8		39° 55′.2		40° 09′.8	
39° 49′.6				40° 02′.5			
Mean, 39° 56′							

Polarity of marked end south.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
39 59	40 09	40 09	40 08	39 46	39 45	40 05	39 54
56	04	07	07	49	48	06	55
57.5	06.5	08	07.5	47.5	46.5	05.5	54.5
40° 02′		40° 07′.7		39° 47′		40° 00′	
40° 04′.8				39° 53′.5			
Mean, 39° 59′.1							

Resulting dip, 39° 57′.5.

March 19, 1889.
Local time of beginning, 8:40 a. m.
Local time of ending, 9:20 a. m.

Circle in Mag. prime vertical.		
		° ′
Circle N.	Needle N.	47 26
	" S.	48 30
Circle S.	" N.	48 23
	" S.	48 40
	Mean,	48 14.8

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
40 06	40 02	39 40	39 40	40 22	40 22	39 55	39 54
07	02	56	51	23	22	57	55
06.5	02	48	45.5	22.5	22	56	54.5
40° 04′.2		39° 46′.7		40° 22′.2		39° 55′.3	
39° 55′.4				40° 08′.6			
Mean, 40° 02′							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
40 14	40 15	39 47	39 56	40 11	39 59	39 52	39 58
16	17	48	56	10	59	50	57
15	16	47.5	56	10.5	59	51	57.5
40° 15′.5		39° 51′.7		40° 04′.7		39° 54′.2	
40° 03′.6				39° 59′.4			
Mean, 40° 01′.5							

Resulting dip, 40° 01′.7

March 16, 1889.
Local time of beginning, 3:20 p. m.
Local time of ending, 3:45 p. m.

Circle in Mag. prime vertical.		
		° ′
Circle N.	Needle N.	17 31
	" S.	18 24
Circle S.	" N.	17 57
	" S.	18 38
	Mean,	18 08

Observations for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at Salina Cruz, Mexico, March 16 and 17, 1889, by Ensign J. H. L. Holcombe, long magnet deflecting at right angles to short magnet suspended.

Distance $r = 0^m.445$.

Magnet.	North end.	No.	Circle readings. A.	B.	Mean.	No.	Circle readings. A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	73 44 50	45 00	44 55				
	W.					2	68 10 00	10 20	10 10
	E.	3	44 40	45 00	44 50				
	W.					4	10 00	10 00	10 00
	E.	5	44 40	45 00	44 50				
	Mean,		73° 44′ 52″				68° 10′ 05″		
West.	W.					6	68 08 00	08 10	08 10
	E.	7	73 41 20	41 20	41 20				
	W.					8	08 00	08 20	08 10
	E.	9	41 20	41 20	41 20				
	W.					10	08 00	08 20	08 10
	Mean,		73° 41′ 20″				68° 08′ 10″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} \text{-----}\right)$

	° ′
Magnet east, $2u =$	5 34.78
Magnet west, $2u =$	5 33.17
Mean,	5 33.97
$u =$	2 46.98

		Logarithms.
Time of beginning, 4:30 p. m.	Temp., 29.0°	
Time of ending, 5:00	Temp., 27.5	
Mean, 4:45	$t =$ 28.2	
	$\frac{1}{2} r^3$	8.64367
	Sin u	8.68621
	$1 - \frac{P}{r^2}$	9.99905
	temp., etc.	0.00475
	$\frac{m}{H}$	7.33367

Distance $r = 0^m.415$.

Magnet.	North end.	No.	Circle readings. A.	B.	Mean.	No.	Circle readings. A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East	E.	1	74 27 00	27 00	27 10				
	W.						67 34 00	34 00	34 00
	E.	3	27 20	27 00	27 10	2			
	W.						34 00	34 00	34 00
	E.	5	27 00	27 00	27 00	4			
	Mean,		74° 27′ 03″				67° 34′ 00″		
West.	W.					6	67 31 20	31 20	31 20
	E.	7	74 22 40	23 00	22 50				
	W.					8	31 40	31 40	31 40
	E.	9	23 00	23 00	23 00				
	W.					10	32 00	32 00	32 00
	Mean,		74° 22′ 55″				67° 31′ 40″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^3} \text{------}\right)$

	° ′
Magnet east, $2u =$	6 53.05
Magnet west, $2u =$	6 51.25
Mean,	6 52.15
$u =$	3 26.07

		Logarithms.
Time of beginning, 3:05 p. m.	Temp., 31.2°	
Time of ending, 3:37	Temp., 29.8	
Mean, 3:21	$t =$ 30.5	
	$\frac{1}{2} r^3$	8.55161
	Sin u	8.77747
	$1 - \frac{P}{r^2}$	0.00173
	temp., etc.	0.00516
	$\frac{m}{H}$	7.33597

Observations of vibrations, made at Salina Cruz, Mexico, March 19, 1889, by Ensign J. H. L. Holcombe.

Chro. error, Daily rate + 3ˢ.187.

	Civil time, a. m.	Temp. of magnet.	Hor. force magnetometer.	Hor. force thermometer.
	h. m.	°		
At commencement	5 48	32.0 C.		
At end	6 25	31.8		
Means	... ...	31.9		
Corrected means	.. ..	31.6		

Scale moving apparently— To the right.			Scale moving apparently— To the left.			Torsion force.		
No. of Vib.	Time of passing wire.	Time of 180 Vib's.	No. of Vib.	Time of passing wire.	Time of 180 Vib's.	Torsion.	Scale divisions.	Means and differences.
	h. m. s.	m. s.		h. m. s.	m. s.			
0	11 29 7.0		9	11 29 37.0		0	40.00	
180	39 7.6	10 0.6	189	39 37.6	10 0.6	+ 90	41.55	
18	30 6.8		27	30 37.0		0	40.00	For 90°
198	40 7.4	10 0.6	207	40 37.6	10 0.6	− 90	38.00	
36	31 6.7		45	31 36.8		0	40.00	
216	41 7.6	10 0.9	225	41 37.6	10 0.8	+360	47.50	For 360°
54	32 6.7		63	32 36.6		0	39.60	For 90°
234	42 7.7	10 1.0	243	42 37.5	10 0.9	−360	32.50	Adopted effect 90°
72	33 6.6		81	33 36.6		0	40.50	Torsion 1.88 Sc.Div.
252	43 7.6	10 1.0	261	43 37.7	10 1.1	$v = 3'.38$		1 Sc. Div. = 1'.8
90	34 6.6		99	34 36.6		$1 + \frac{h}{F} = 1.00063$		
270	44 7.6	10 1.0	279	44 37.8	10 1.2			
$\frac{90}{0}$ Time for 180th.			$\frac{99}{9}$ Time for 189th.			Vertical scale, 25		
Mean		10 0.85	Time, 90 Vib.		10 0.87			
Meantime—180 Vib's		600ˢ.86	Time, 1 Vib.	$= T_0 =$	3ˢ.338			

Time azimuths taken at Port Plata, San Domingo, December 28, 1889, by Ensign L. M. Garrett, with theodolite; chronometer 1596, $11^{m}\ 52^{s}.31$ slow on G. M. T.

	Before. ° ′ ″	After. ° ′ ″
Reading of mark, A	326 05 00	326 05 30
B	146 04 30	146 05 00

Chronometer time, p. m.	Reading of circle. A.	Reading of circle. B.	Telescope.	Remarks.
h. m. s.	° ′ ″	° ′ ″		
8 29 07	☉| 345 05 30	☉| 165 05 30	Direct.	
31 17.5	|☉ 345 23 00	|☉ 165 23 00	Direct.	
36 50	☉| 344 07 30	☉| 164 07 00	Direct.	
38 58	|☉ 344 26 00	|☉ 164 25 30	Direct.	
8 49 44	☉| 162 32 30	☉| 342 32 30	Inverted.	
52 20.5	|☉ 162 48 00	|☉ 342 47 30	Inverted.	
55 11.0	☉| 161 54 00	341 54 00	Inverted.	

	Before. ° ′ ″	After. ° ′ ″
Reading of mark, A	146 02 30	146 02 30
B	326 02 30	326 02 30

Latitude, 19° 49′ 29″ N. Longitude, $4^{h}\ 42^{m}\ 47^{s}.6$ W.

Solution by: $\left.\begin{array}{l}\text{Tan X} = \sin D \operatorname{cosec} S \cot \tfrac{1}{2} t \\ \text{Tan Y} = \cos D \sec S \cot \tfrac{1}{2} t \\ \text{Az.} - X \pm Y\end{array}\right\} \begin{array}{l} S = \tfrac{1}{2}[p + (90^\circ - \varphi)] \\ D = \tfrac{1}{2}[p - (90^\circ - \varphi)]\end{array}$

Observations for declination made at Port Plata, San Domingo, December 25, 1889, by Ensign L. M. Garrett, with Kew theodolite magnetometer No. 54, with long magnet suspended.

Line of detorsion, 20°.

Local time.	Scale readings.		Mean.	Azimuth circle, A 33° 22′ 20″; B 22′ 40″.
a. m.	Left.	Right.		
h. m.	*d.*	*d.*	*d.*	Remarks:
8 15			39.80	Removed torsion and suspended magnet at 8:00.
30	33.6	46.6	40.10	
45	38.4	41.8	40.10	
9 00	39.3	41.5	40.40	
15	39.8	40.8	40.30	
30	40.3	40.8	40.55	
45	40.2	40.9	40.55	
10 00	40.2	40.5	40.35	
15	39.6	40.8	40.20	
30	39.6	39.9	39.75	
p. m.	Line of detorsion, 45°			Azimuth circle, A 33° 22′ 20″; B 22′ 40″
12 30	36.1	39.0	37.60	Remarks: Replaced magnet at 12:20: moved torsion head to 45°.
45	36.8	37.8	37.30	
1 00	37.2	37.7	37.40	
15	37.3	37.7	37.50	
30	36.2	38.4	37.30	
45	36.8	38.0	37.40	
2 00	35.8	38.0	36.90	
15	36.8	37.6	37.20	
30	37.0	37.2	37.10	
45	37.0	37.2	37.10	
3 00	37.2	37.2	37.20	
15	37.2	37.7	37.40	
30	37.3	37.9	37.60	Determined axis and scale value.

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″	′ ″						*d.*
0	34 30 40		E	37.3	37.7	37.50		
10	12 40	18 00	I	18.2	15.0	16.60	37.40	27.00
20	33 54 50	17 50	E	36.2	38.4	37.30	16.62	26.96
30	36 50	18 00	I	19.7	13.6	16.65	37.35	27.00
40	18 40	18 10	E	36.8	38.0	37.40	16.65	27.02
50	0 20	18 20	I	19.3	14.0	16.65	37.22	26.94
60	32 42 10	18 10	E	36.1	38.0	37.05		
70	24 10	18 00						
80	6 00	18 10						
70	24 00	18 00						
60	42 10	18 10						
50	33 00 20	18 10						
40	18 20	18 00						
30	36 30	18 10						
20	54 30	18 00						
10	34 12 40	18 10						
0	30 40	18 00						
Value of one division of scale = 1′.808.			Scale reading of axis					26.98

Mean scale reading of east and west magnetic elongation . . .			38.83
	° ′		
Reduction to axis	0 21.25	= difference =	11.85
Azimuth circle reads	33 22.30		
Magnetic meridian reads	33 43.55	° ′ ″	
At beginning of a. m. observations .	. . . . . .	A 108 22 40	
		B 22 20	
At end of p. m. observations . . .	. . . . . .	A 22 00	
		B 21 40	
Mean reading of mark	108 22.10	= 108 22 10	
Azimuth of mark S. of W.	75 15.21		
True meridian reads	33 06.49		
Magnetic declination	0 37.06	E.	

Observations for declination made at Port Plata, San Domingo, December 26, 1889, by Ensign L. M. Garrett, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion 20°.

Local time.	Scale reading. Left.	Scale reading. Right.	Mean.	Azimuth circle, A 33° 22′ 00″; B 22′ 00″
a. m.				
h. m.	d.	d.	d.	Remarks:
9 15	40. 1	40. 7	40. 40	Removed torsion weight and suspended magnet at 9:00 a. m.
30	40. 5	40. 7	40. 60	
45	40. 5	40. 7	40. 60	
10 00	40. 6	40. 6	40. 60	
15	40. 6	40. 6	40. 60	
30	40. 4	40. 5	40. 50	
45	40. 2	40. 3	40. 30	After last reading, suspended torsion weight.
11 00				
p. m.	Line of detorsion 20°			Azimuth circle, A 33° 22′ 00″; B 22′ 00″
2 00	35. 8	37. 8	36. 80	Remarks: Removed weight and suspended magnet at 1:55 p. m.
15	35. 8	37. 2	36. 50	
30	36. 1	36. 8	36. 45	
45	36. 2	36. 5	36. 35	
3 00	36. 1	36. 9	36. 50	
15	36. 5	36. 7	36. 60	Observed for scale value and axis after last reading.
30	36. 8	36. 8	36. 80	

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Scale readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″	′ ″						d.
0	34 29 30		E	36. 8	36. 8	36. 80		
10	11 20	18 10	I	19. 3	15. 7	17. 50	36. 85	27. 15
20	33 53 10	18 10	E	34. 0	39. 8	36. 90	17. 45	27. 15
30	35 10	18 00	I	20. 2	14. 6	17. 40	36. 85	27. 15
40	16 50	18 20	E	35. 6	38. 0	36. 80	17. 40	27. 12
50	32 58 30	18 20	I	18. 9	15. 9	17. 40	36. 85	27. 13
60	40 00	18 30	E	36. 0	37. 8	36. 90		
70	22 20	17 40						
80	04 00	18 20						
70	22 10	18 10						
60	40 10	18 00						
50	58 50	18 40						
40	33 17 10	18 20						
30	35 40	18 30						
20	53 50	18 10						
10	34 12 00	18 10						
0	30 00	18 00						
Value of one division of scale = 1′.822.			Scale reading of axis					27. 14

Mean scale reading of east and west magnetic elongation			38. 47
	° ′		
Reduction to axis	0 20. 63	= difference =	11. 33
Azimuth circle reads	33 22. 00		
Magnetic meridian reads	33 42. 38	° ′ ″	
At beginning of a. m. observations .	. . . .	A 108 23 00	
		B 22 40	
At end of p. m. observations . . .	. . . . . .	A 21 20	
		B 21. 00	
Mean reading of mark	108 22 00	= 108 22 00	
Azimuth of mark S. of W . . .	75 15 21		
True meridian reads	33 06 39		
Magnetic declination	0 35 59	E.	

Observations for dip made at Port Plata, San Domingo, December 19 and 21, 1889, by Lieut. Charles Laird, with dip circle No. 84, and needle A 1.

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
49 58	49 37	49 35	49 26	50 21	50 27	49 50	50 07
58	36	36	26	11	18	48	05
58	36.5	35.5	26	16	22.5	49	06
49° 47′.2		49° 30′.7		50° 19′.2		49° 57′.5	
49° 39′				50° 08′.3			
Mean, 49° 53′.6							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
50 21	50 22	49 34	49 52	49 59	49 37	49 29	49 20
16	17	37	54	57	35	27	18
18.5	19.5	35.5	53	58	36	28	19
50° 19′		49° 44′.2		49° 47′		49° 23′.5	
50° 01′.6				49° 35′.2			
Mean, 49° 48′.4							

Resulting dip, 49° 51′.0.

December 19, 1889.
Local time of beginning, 9:30 a. m.
Local time of ending, 11:30 a. m.
Magnetic meridian reads 90° 22′

Circle in Mag. prime vertical.

		° ′
Circle N.	Needle N.	90 30
	" S.	10
Circle S.	" N.	15
	" S.	35
	Mean,	90 22.5

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
50 04	49 41	49 29	49 20	50 19	50 23	49 41	49 58
05	43	29	20	20	25	44	50 01
04.5	42	29	20	19.5	24	42.5	49 59.5
49° 53′.2		49° 24′.5		50° 21′.7		49° 51′	
49′ 38′.8				50° 06′.3			
Mean, 49° 52′.6							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
49 53	50 11	50 09	50 12	49 57	49 29	49 35	49 25
49	06	09	13	54	29	35	25
51	08.5	09	12.5	55.5	29	35	25
49° 59′.7		50° 10′.7		49° 42′.2		49° 30′	
50° 05′.2				49° 36′.1			
Mean, 49° 50′.6							

Resulting dip, 49° 51′.6.

December 21, 1889.
Local time of beginning, 2:30 p. m.
Local time of ending, 4:00 p. m.
Magnetic meridian reads 90° 06′

Circle in Mag. prime vertical.

		° ′
Circle N.	Needle N.	90 15
	" S.	89 25
Circle S.	" N.	90 54
	" S.	89 51
	Mean,	90 06

Observations for dip made at Port Plata, San Domingo, December 20 and 25, 1889, by Lieut. Charles Laird, with dip circle No. 84 and needles A 2 and A 1.

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
49 29	49 14	50 04	49 40	49 50	50 01	50 38	50 43
29	14	03	39	48	49 59	33	38
29	14	03.5	39.5	49	50.00	35.5	40.5
49° 21′.5		49 51′.5		49° 54′.5		50° 38′.0	
49° 36′.5				50° 16′.2			
Mean, 49° 56′.3							
Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
49 37	49 49	50 21	50 28	49 27	49 15	49 26	49 15
39	50	23	29	28	14	27	14
38	49.5	22	28.5	27.5	14.5	26.5	14.5
49° 43′.7		50° 25′.2		49° 21′		49° 20′.5	
50° 04′.4				49° 20′.7			
Mean, 49° 42′.5							
Resulting dip, 49° 49′.4							

December 20, 1889.
Local time of beginning, 2:10 p. m.
Local time of ending, 4:10 p. m.
Magnetic meridian reads 30° 20′

Circle in Mag. prime vertical.

			° ′
Circle N.	Needle	N.	29 36
	"	S.	32 35
Circle N.	"	N.	28 23
	"	S.	30 46
		Mean,	30 20

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
49 52	49 46	49 20	49 24	50 22	50 11	49 43	49 44
55	50	23	25	24	12	42	44
53.5	48	21.5	24.5	23	11.5	42.5	44
49° 50′.7		49° 23′		50° 17′.2		49° 43′.2	
49° 36′.8				50° 00′.2			
Mean, 49° 48′.5							
Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
50 18	50 07	49 51	49 51	49 51	49 46	49 23	49 25
20	09	52	51	52	47	22	24
19	08	51.5	51	51.5	46.5	22.5	24.5
50° 13′.5		49° 51′.2		49° 49′		49° 23′.5	
50° 02′.3				49° 36′.2			
Mean, 49° 49′.2							
Resulting dip, 49° 48′.8							

December 25, 1889.
Local time of beginning, 9:45 a. m.
Local time of ending, 10:45 a. m.
Magnetic meridian reads 30° 12′

Circle in Mag. prime vertical.

			° ′
Circle N.	Needle	N.	30 23
	"	S.	29 52
Circle S.	"	N.	30 32
	"	S.	30 01
		Mean,	30 12

Observations for dip made at Port Plata, San Domingo, December 23 and 25, 1889, by Ensign L. M. Garrett, with dip circle No. 84 and needle No. A1.

[Mean by polarities.]

Polarity of marked end north.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
49 26	49 30	49 47	49 38	39 55	49 54	50 16	50 04
25	30	47	38	57	55	15	03
25.5	30	47	38	56	54.5	15.5	03.5
49° 27′.7		49° 24′.5		49° 55′.2		50° 09′.5	
49° 35′.1				50° 02′.3			
Mean, 49° 48′.7							

Polarity of marked end south.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
19 53	49 52	50 34	50 23	49 19	49 22	49 53	49 45
52	53	35	22	18	23	54	47
52.5	52.5	34.5	22.5	18.5	22.5	53.5	46
49° 52′.5		50° 28′.5		49° 20′.5		49° 49′.7	
50° 10′.5				49° 35′.1			
Mean, 49° 52′.8							

Resulting dip, 49° 50′.7.

December 23, 1889.
Local time of beginning, 1:45 p. m.
Local time of ending, 3:45 p. m.
Magnetic meridian reads 60° 08′.

Circle in Mag. prime vertical.		° ′
Circle N.	Needle N.	59 27
	" S.	60 11
Circle S.	" N.	60 06
	" S.	60 47
	Mean,	60 08

[Mean by polarities.]

Polarity of marked end north.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
49 24	49 26	49 48	49 43	49 54	49 53	50 23	50 11
23	27	50	43	55	54	23	11.5
23.5	26.5	49	43	54.5	53.5	23	11.2
49° 25′		49° 46′		49° 54′		50° 17′	
49° 35′.5				50° 05′.5			
Mean, 49° 50′.5							

Polarity of marked end south.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
49 47	49 46	50 30	50 19	48 18	49 18	50 00	49 52
46	46	32	21	14	19	00	54
46.5	46	31	20	16	18.5	00	53
49° 46′.2		50° 25′.5		49° 17′.2		49° 56′.5	
50° 05′.8				49° 36′.8			
Mean, 49° 51′.3							

Resulting dip, 49° 50′.9.

December 25, 1889.
Local time of begin'g, 12:35 p. m.
Local time of ending, 1:50 p. m.
Mag. meridian reads 30° 09′.5.

Circle in Mag. prime vertical.		° ′
Circle N.	Needle N.	29 22
	" S.	30 22
Circle S.	" N.	30 01
	" S.	30 53
	Mean,	30 09

Observation for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at Port Plata, San Domingo, December 19, 1889, by Ensign L. M. Garrett, with long magnet deflecting at right angles to short magnet, suspended.

Distance $r = 0^m.300$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	183 31 20	31 40	31 30				
	W.					2	163 21 00	21 20	21 10
	E.	3	31 20	31 40	31 30				
	W.					4	21 00	21 20	21 10
	E.	5	30 20	30 40	30 30				
	Mean,		183° 31′ 10″				163° 21′ 10″		
West.	W.					6	163 13 40	14 20	14 00
	E.	7	183 14 20	14 40	14 30				
	W.					8	13 40	14 20	14 00
	E.	9	14 20	14 40	14 30				
	W.					10	14 20	15 00	14 40
	Mean,		183° 14′ 30″				163° 14′ 13″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} - - - - - -\right)$

			Logarithms.
Magnet east, $2u$ = 20° 10′.00			
Magnet west, $2u$ = 20 00.17		$\frac{1}{2} r^3$	8.13072
Mean, 20 05.08		Sin u	9.24141
u = 10 02.34		$1 - \frac{P}{r^2}$	9.99697
Time of beginning, 9:25 a.m.	Temp., 28°.0 C.	temp., etc.	0.00490
Time of ending, 10:20 a.m.	Temp., 29.0		
Mean, 9:52	t = 28.5	$\frac{m}{H}$	7.37400

Distance $r = 0^m.200$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	210 37 20	37 20	37 20				
	W.					2	137 18 20	18 20	18 20
	E.	3	40 00	40 20	40 10				
	W.					4	16 40	17 00	16 50
	E.	5	41 00	40 40	50 40				
	Mean,		210° 39′ 27″				137° 17′ 35″		
West.	W.					6	136 33 40	33 40	33 40
	E.	7	208 50 20	50 40	50 30				
	W.					8	31 00	31 00	31 00
	E.	9	50 40	50 40	50 40				
	W.					10	29 00	29 00	29 00
	Mean,		208° 50′ 35″				136° 31′ 13″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^3} - - - - - -\right)$

			Logarithms.
Magnet east, $2u$ = 73° 21′.52			
Magnet west, $2u$ = 72 19.22		$\frac{1}{2} r^3$	7.60225
Mean, 72 50.37		Sin u	9.77358
u = 36 25 18		$1 - \frac{P}{r^2}$	9.99315
Time of beginning, 10:50 a.m.	Temp., 28°.4 C.	temp., etc.	0.00536
Time of ending, 11:40 a.m.	Temp., 29.4		
Mean, 11:30	t = 28.9	$\frac{m}{H}$	7.37434

Observation for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at Port Plata, San Domingo, December 23, 1889, by Ensign L. M. Garrett, with long magnet deflecting at right angles to short magnet, suspended.

Distance $r = 0^m.300$.

Magnet.	North end.	No.	Circle readings. A.	B.	Mean.	No.	Circle readings. A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	183 14 00	14 20	14 10				
	W.					2	163 01 20	1 20	1 20
	E.	3	13 20	13 20	13 20				
	W.					4	01 20	1 00	1 10
	E.	5	13 20	13 20	13 20				
	Mean,		183° 13′ 40″				163° 01′ 15″		
West.	W.					6	162 50 00	49 40	49 50
	E.	7	182 54 50	55 00	54 55				
	W.					8	49 20	49 20	49 20
	E.	9	54 20	54 20	54 20				
	W.					10	49 40	50 00	49 50
	Mean,		182° 54′ 37″				162° 49′ 40″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} \text{------}\right)$

			Logarithms.
° ′ ″			
Magnet east, $2u$ = 20 12 25			
Magnet west, $2u$ = 20 04 57		$\frac{1}{2} r^3$	8.13068
Mean, 20 08 41		Sin u	9.24276
u = 10 04 20	°	$1 - \frac{P}{r^2}$	9.99697
Time of beginning, 3:50 p. m.	Temp., 25.2 C.		
Time of ending, 4:30 p. m.	Temp., 25,0	temp., etc.	0.00426
Mean, 4:10	t = 25.1	$\frac{m}{H}$	$\bar{7}$.37467

Observations of vibrations, made at Port Plata, San Domingo, December 22, 1889, by Ensign L. M. Garrett.

Chro. error, $11^m\ 39^s.0$ slow. Daily rate, $2^s.03$ losing.

	Civil time, a. m.	Temp. of magnet.	Hor. force magnetometer.	Hor. force thermometer.
	h. m.	°		
At commencement	10 45	27.5 C.		
At end	11 05	27.5		
Means	. . . . . .	27.5		
Corrected means .	. . . .	27.1		

Scale moving apparently—						Torsion force.		
To the right.			To the left.					
No. of Vib.	Time of passing wire.	Time of 180 Vib's.	No. of Vib.	Time of passing wire.	Time of 180 Vib's.	Torsion.	Scale divisions.	Means and differences.
	h. m. s.	*m. s.*		*h. m. s.*	*m. s.*			
0	3 17 45.0		9	3 18 17.0		0	39.20	
180	28 24.0	10 39.0	189	28 55.9	10 38.9	+ 90	39.50	
18	18 49.0		27	19 21.0		0	39.15	For 90°
198	29 27.8	10 38.8	207	29 59.7	10 38.7	— 90	38.90	
36	19 53.0		45	20 24.9		0	39.05	
216	30 31.6	10 38.6	225	31 03.5	10 38.6	+360	39.83	For 360
54	20 56.8		63	21 28.7		0	38.57	For 90°
234	31 35.5	10 38.7	243	32 07.4	10 38.7	—360	37.55	Adopted effect 90°
72	22 00.5		81	22 32.5		0	38.56	Tors'n 0.256 Sc.Div.
252	32 39.3	10 38.8	261	33 11.3	10 38.8	$v=0'.46$		1 Sc. Div.$=1'.8$
90	23 04.5		99	23 36.4				
270	33 43.3	10 38.8	279	34 15.3	10 38.9	$1+\frac{h}{F}=1.00009$		
$\frac{90}{0}$	05 19.5		$\frac{99}{0}$	5 19.4		Vertical scale, 19.3		
Time for 180th.	28 24.0	60 232.7	Time for 189th.	28 55.8	60 232.6			
Mean		10 38.775	Time, 90 vib.	$319^s.3875$				
Mean time--180 vibs.		$638^s.775$	Time, 1 vib.	$= T_0 =$	$3^s.5497$			

Observations of vibrations, made at Port Plata, San Domingo, December 22, 1889, by Ensign L. M. Garrett.

Chro. error, $11^{m}\ 39^{s}.5$ slow. Daily rate, $2^{s}.03$ losing.

	Civil time, p. m.	Temp. of magnet.	Hor. force magnetometer.	Hor. force thermometer.
	h. m.	°		
At commencement.	3 50	25.8 C.		
At end	4 30	25.8		
Means	....	25.8		
Corrected means .	....	25.4		

Scale moving apparently—						Torsion force.		
To the right.			To the left.					
No. of Vib.	Time of passing wire.	Time of 180 Vib's.	No. of Vib.	Time of passing wire.	Time of 180 Vib's.	Torsion.	Scale divisions.	Means and differences.
	h. m. s.	*m. s.*		*h. m. s.*	*m. s.*			
0	8 24 34.3		9	8 25 06.2		0	40.00	
180	35 13.1	10 48.8	189	35 45.1	10 38.9	+ 90	40.22	
18	25 38.2		27	26 10.2		0	40.00	For 90°
198	36 17.1	10 38.9	207	36 49.0	10 38.8	− 90	39.60	
36	26 42.1		45	27 14.0		0	40.20	
216	37 21.0	10 38.9	225	37 53.0	10 39.0	+360	41.13	For 360°
54	27 46.0		63	28 18.0		0	40.10	For 90°
234	38 24.9	10 38.9	243	38 56.8	10 38.8	−360	39.10	Adopted effect 90°
72	28 49.9		81	29 21.8		0	40.20	Tors'n 0.261 Sc.Div.
252	39 28.7	10 38.8	261	40 00.7	10 38.9	$v=0'.47$		1 Sc. Div. = 1'.8
90	29 53.7		99	30 25.6				
270	40 32.5	10 38.8	279	41 04.5	10 38.9	$1+\frac{h}{F}=1.00009$		
$\frac{90}{0}$	05 19.4	60 233.1	$\frac{99}{9}$	05 19.4	60 233.3	Vertical scale, 16.8		
Time for 180th.	35 13.1	10 38.85	Time for 189th.	35 45	10 38 88			
Mean		10 38.865	Time, 90 Vib.	$319^{s}.432$				
Mean time—180 vib's.		$638^{s}.865$	Time, 1 Vib.	$= T_0 =$	$3^{s}.5492$			

Time azimuths taken at Curaçao, West Indies, January 31, 1890, by Ensign L. M. Garrett, with theodolite and chronometer 1596 $13^m\ 07^s.24$ slow on G. M. T.

	Before.	After.
	° ′ ″	° ′ ″
Reading of mark, A	286 18 00	286 17 30
B	106 17 30	106 17 30

Chronometer time, p. m.	Reading of circle. A.	Reading of circle. B.	Telescope.	Remarks.
h. m. s.	° ′ ″	° ′ ″		
8 27 25.5	☉ 344 46 30	164 46 00		
28 42.5	☉ 344 38 30	164 38 00		
29 48.5	☉ 344 31 00	164 31 00		
30 49.0	☉ 344 24 00	164 24 30		
31 39.0	☉ 344 20 00	164 19 30		

Latitude, 12° 06′ 45″ N. Longitude, $4^h\ 35^m\ 48^s.1$ W.

Solution by: $\left.\begin{array}{l}\text{Tan X} = \sin D \operatorname{cosec} S \cot \tfrac{1}{2} t \\ \text{Tan Y} = \cos D \sec S \cot \tfrac{1}{2} t \\ \text{Az} = X \pm Y\end{array}\right\}\ \begin{array}{l} S = \tfrac{1}{2}[p+(90^\circ-\varphi)] \\ D = \tfrac{1}{2}[p-(90^\circ-\varphi)]\end{array}$

Observations for declination made at Curaçao, West Indies, January 28, 1890, by Ensign L. M. Garrett, with Kew theodolite magnetometer No. 54, with long magnet, suspended erect.

Line of detorsion, 90°.

Local time.	Scale readings. Left.	Scale readings. Right.	Mean.	Azimuth circle, A 60° 40′ 00″; B 39′ 40″
a. m.				
h. m.	d.	d.	d.	Remarks:
9 00	39.0	40.0	39.5	Removed torsion weight and suspended magnet at 8:45.
15	39.1	39.7	39.4	
30	39.6	39.6	39.6	
45	39.6	40.0	39.8	
10 00	39.4	40.0	39.7	
15	39.7	39.9	39.8	
30	38.8	40.6	39.7	
45	39.5	40.0	39.7	
11 00	39.7	39.9	39.8	Removed magnet and suspended weight.
p. m.	Line of detorsion, 90°.			Azimuth circle, A 60° 40′ 00″; B 39′ 40″
12 30	38.3	39.2	38.70	Remarks: Removed weight and suspended magnet at 12:15 p. m. No torsion.
45	38.3	38.8	38.50	
1 00	38.0	39.0	38.50	
15	38.0	38.2	38.10	
30	37.8	38.3	38.05	
45	37.8	38.0	37.90	
2 00	37.8	37.8	37.80	
15	37.8	37.8	37.80	
30	37.8	37.8	37.80	
45	37.8	37.8	37.80	Determined scale value and axis.

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
0	61 47 30		E	37.2	37.8	37.50	37.52	
10	29 10	18 20	I	15.6	17.8	16.70	16.75	27.13
20	11 00	18 10	E	37.0	38.1	37.55	37.47	27.11
30	60 52 50	18 10	I	16.6	17.0	16.80	16.80	27.13
40	34 40	18 10	E	37.1	37.7	37.40	37.37	27.08
50	16 20	18 20	I	16.1	17.5	16.80	16.75	27.06
60	59 58 10	18 10	E	36.7	38.0	37.35	37.42	27.08
70	39 40	18 30						
80	21 20	18 20						
70	39 30							
60	58 00							
50	60 16 10							
40	34 40							
30	52 35							
20	61 10 50							
10	29 10							
0	47 10							
Value of one division of scale = 1′.826.			Scale reading of axis					27.10

Mean scale reading of east and west magnetic elongation			38.80
	° ′		
Reduction to axis	0 21.34	= difference =	11.70
Azimuth circle reads	60 39.83		
Magnetic meridian reads	61 01.17	° ′ ″	
At beginning of a. m. observations		A 181 09 20	
		B 09 20	
At end of p. m. observations		A 09 40	
		B 09 40	
Mean reading of mark	181 09.50	= 181 09 30	
Azimuth of mark W. of N.	122 37.16		
True meridian reads	58 32.34		
Magnetic declination	2 28.83		
	2° 28′ 50″	E.	

Observations for declination made at Curaçao, West Indies, January 29, 1890, by Ensign L. M. Garrett, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 70°.

Local time.	Scale readings. Left.	Scale readings. Right.	Mean.	Azimuth circle, A 60° 38′ 00″; B 37′ 40″
a. m.				
h. m.	d.	d.	d.	Remarks:
9 00	39.6	40.6	40.10	Removed torsion and suspended magnet at 8:50 a. m.
15	39.8	40.2	40.00	
20	39.9	40.3	40.10	
45	40.1	40.6	40.35	? Probable disturbance.
10 00	40.0	40.2	40.10	
15	40.0	40.2	40.10	
30	39.9	40.3	40.10	
45	39.8	40.0	39.90	
55	39.7	39.9	39.80	Removed magnet and suspended torsion weight.
p. m.	Line of detorsion °			Azimuth circle, A 69° 38′ 00″; B 37′ 40″
12 30	38.7	39.0	38.85	Remarks: Removed weight and suspended magnet at 12:05.
45	38.5	38.7	38.60	
1 00	38.3	38.5	38.40	
15	38.1	38.4	38.25	
30	38.0	38.2	38.10	
45	37.9	38.1	38.00	
2 00	38.0	38.2	38.10	After last reading determined axis and scale value of magnet.

Determination of scale value of magnet.

Scale.	Circle readings, mean of verniers.	Value of 10 divisions.
	° ′ ″	
0	61 47 10	
10	29 20	17 50
20	11 00	18 20
30	60 53 00	18 00
40	34 30	18 30
50	16 10	18 20
60	59 57 50	18 20
70	39 40	18 10
80	21 20	18 20
70	39 50	18 30
60	57 55	18 05
50	60 16 10	18 15
40	34 30	18 20
30	52 45	18 15
20	61 10 50	18 05
10	29 10	18 20
0	47 20	18 10

Value of one division of scale = 1′.825.

Determination of axis of magnet.

Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
					d.
E	38.0	38.2	38.10	38.20	27.13
I	17.2	15.0	16.10	16.07	27.12
E	37.7	38.9	38.30	38.17	27.08
I	16.2	15.9	16.05	16.00	27.05
E	38.3	37.8	38.05	38.10	27.06
I	16.9	15.0	15.95	16.02	27.07
E	37.5	38.8	38.15	38.12	

Scale reading of axis 27.085

Mean scale reading of east and west magnetic elongation 39.050

	° ′		
Reduction to axis	0 21.83	= Difference =	11.965
Azimuth circle reads	60 37.83		
Magnetic meridian reads	60 59.66	° ′ ″	
At beginning of a. m. observations . .	. . . . .	A 181 09 40	
		B 09 40	
At end of p. m. observations	. . . . . .	A 09 00	
		B 09 00	
Mean reading of mark	181 09.33	= 181 09 20	
Azimuth of mark W. of N.	122 37.16		
True meridian reads	58 32.17		
Magnetic declination	2 27.49		
	2° 27′ 30″	E.	

Observations for dip made at Curaçao, West Indies, January 26, 1890, by Lieut. Charles Laird, with dip circle No. 84 and needle No. A 1.

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
39 12	39 09	39 00	39 02	40 04	39 42	39 20	39 11
12	09	01	03	05	43	21	11
12	09	00.5	02.5	04.5	42.5	20 5	11
39° 10′.5		30° 01′.5		39° 53′.5		39° 15′.7	
39° 06′				39° 34′.6			
Mean, 39° 20′.3							
Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
39 43	39 29	39 00	38 56	39 08	39 10	38 37	38 47
44	28	01	57	07	09	40	49
43.5	28.5	00.5	56.5	07.5	09.5	38.5	48
39° 36′		38° 58′.5		39° 08′.5		38° 43′.5	
39° 17′.2				38° 56′			
Mean, 39° 06′.1							
Resulting dip, 39° 13′.2.							

January 26, 1890.
Local time of beginning, 9:45 a. m.
Local time of ending, 11:45 a. m.
Magnetic meridian reads 30° 58′

Circle in Mag. prime vertical.			
			° ′
Circle N.	Needle N.		30 58
	"	S.	30 25
Circle S.	"	N.	31 24
	"	S.	30 07
	Mean,		30 44

[Mean by polarities.]

Polarity of marked end north.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
38 41	38 53	39 19	39 15	39 10	39 06	39 45	39 31
41	53	16	13	10	06	42	27
41	53	17.5	14	10	06	43.5	29
38° 47′		39° 15′.7		39° 08′		39° 36′.2	
39° 01′.3				39° 22′.1			
Mean, 39° 11′.7							
Polarity of marked end south.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
39 20	39 15	39 45	39 29	38 44	38 54	39 13	39 10
20	15	43	27	44	54	10	07
20	15	44	28	44	54	11.5	08.5
39° 17′.5		39° 36′		38° 49′		39° 10′	
39° 26′.7				38° 59′.5			
Mean, 39° 13′.1							
Resulting dip, 39° 12′.4.							

January 26, 1890.
Local time of beginning, 12:45 p.m.
Local time of ending, 2:00 p.m.
Magnetic meridian reads 30° 34′

Circle in Mag. prime vertical.			
			° ′
Circle N.	Needle N.		29 58
	"	S.	31 11
Circle S.	"	N.	30 08
	"	S.	30 58
	Mean,		30 34

Observations for dip made at Curaçao, West Indies, January 27, 1890, by Lieut. Charles Laird, with dip circle No. 84 and needle No. A 1.

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
39 05	39 05	38 41	38 53	39 43	39 28	39 17	39 13
06	05	40	51	43	28	15	10
05.5	05	40.5	52	43	28	16	11.5
39° 05′.2		38° 46′.2		39° 35′.50		39° 13′.8	
38° 55′.7				39° 24′.6			
Mean, 39° 10′							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
39 40	39 26	39 18	39 15	39 03	39 02	38 43	38 53
40	26	14	11	07	05	43	54
40	26	16	13	05	03.5	43	53.5
39° 33′		39° 14′.5		39° 04′.2		38° 48′.2	
39° 23′.7				38° 56′.2			
Mean, 39° 09′.9							

Resulting dip, 39° 10′

January 27, 1890.	Circle in Mag. prime vertical.		
Local time of beginning, 9:00 a. m.			° ′
Local time of ending, 11:30 a. m.	Circle N.	Needle N.	30 52.5
Magnetic meridian reads 30° 46′		" S.	30 38.0
	Circle S.	Needle N.	31 26.0
		" S.	30 09.5
		Mean,	30 47.0

Observations for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at Curaçao, West Indies, January 26, 1890, by Ensign L. M. Garrett, with long magnet deflecting at right angles to short magnet, suspended.

Distance $r = 0^m.300$.

Magnet.	North end.	No.	Circle readings. A.	B.	Mean.	No.	Circle readings. A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	249 43 00	43 20	43 10				
	W.					2	230 32 00	32 20	32 10
		3	41 40	42 00	41 50				
	W.					4	31 00	31 20	31 10
	E.	5	41 20	41 40	41 30				
	Mean,		249° 42′ 10″				230° 31′ 40″		
West.	W.					6	230 17 20	17 40	17 30
	E.	7	249 24 20	24 40	24 30				
	W.					8	16 00	16 20	16 10
	E.	9	24 20	24 40	24 30				
	W.					10	16 20	16 40	16 30
	Mean,		249° 24′ 30″				230° 16′ 43″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} \text{------}\right)$

				Logarithms.
	° ′ ″			
Magnet east, $2u =$	19 10 30			
Magnet west, $2u =$	19 07 47		$\frac{1}{2} r^3$	8. 13073
Mean,	19 09 08.5		Sin u	9. 22104
$u =$	9 34 34.2		$1 - \frac{P}{r^2}$	9. 99664
Time of beginning,	3:00 p. m.	Temp., 29. 2 °C	temp., etc.	0. 00490
Time of ending,	3:40 p. m.	Temp., 27. 8		
Mean,	3:20	$t =$ 28. 5	$\frac{m}{H}$	7. 35331

Observations for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at Curaçao, West Indies, January 27, 1890, by Ensign L. M. Garrett, with long magnet deflecting at right angles to short magnet, suspended.

Distance $r = 0^{m}.400$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	243 55 40	56 00	55 50				
	W.					2	235 52 30	53 00	52 45
	E.	3	55 00	55 40	55 20				
	W.					4	52 40	53 00	52 50
	E.	5	55 20	55 50	55 35				
	Mean,		243° 55′ 35″				235° 52′ 47″		
West.	W.					6	235 49 40	50 10	49 55
	E.	7	243 50 00	50 20	50 10				
	W.					8	49 40	50 00	49 50
	E.	9	50 00	50 20	50 10				
	W.					10	50 00	50 20	50 10
	Mean,		243° 50′ 10″				235° 49′ 58″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} - - - - - -\right)$

			Logarithms.
° ′ ″			
Magnet east, $2u =$ 8 02 48			
Magnet west, $2u =$ 8 00 12		$\frac{1}{2}r^3$	8. 50555
Mean, 8 01 30		Sin u	8. 84494
$u =$ 4 00 45		$1 - \frac{P}{r^2}$	9. 99811
Time of beginning, 3:15 p. m.	Temp., 29.5° C.	temp., etc.	0. 00502
Time of ending, 3:35 p. m.	Temp., 30.0		
Mean, 3:25	$t = 29.7$	$\frac{m}{H}$	7. 35362

Distance $r = 0^{m}.300$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	249 35 50	36 20	36 05				
	W.					2	230 22 00	22 20	22 10
	E.	3	36 00	36 40	36 20				
	W.					4	22 10	22 20	22 15
	E.	5	36 20	37 00	36 40				
	Mean,		249° 36′ 22″				230° 22′ 12″		
West.	W.					6	230 11 40	12 00	11 50
	E.	7	249 17 40	18 20	18 00				
	W.					8	11 20	11 40	11 30
	E.	9	18 00	18 40	18 20				
	W.					10	11 20	11 50	11 35
	Mean,		249° 18′ 10″				230° 11′ 38″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} - - - - - -\right)$

			Logarithms.
° ′ ″			
Magnet east, $2u =$ 19 14 10			
Magnet west, $2u =$ 19 06 32		$\frac{1}{2}r^3$	8. 13075
Mean, 19 10 21		Sin u	9. 22149
$u =$ 9 35 10		$1 - \frac{P}{r^2}$	9. 99664
Time of beginning, 4:05 p. m.	Temp., 29.8° C.	temp., etc.	0. 00505
Time of ending, 4:45 p. m.	Temp., 28.8		
Mean, 4:25	$t = 29.3$	$\frac{m}{H}$	7. 35393

Observations of vibrations, made at Curaçao, West Indies, January 26, 1890, by Ensign L. M. Garrett.

	Civil time, p. m.	Temp. of magnet.	Hor. force magnetometer.	Hor. force thermometer.
	h. m.	°		
At commencement.	1 15	28.8 C.		
At end	1 45	29.2		
Means.	. . . .	29.0		
Corrected means .				

Scale moving apparently—						Torsion force.		
To the right.			To the left.					
No. of Vib.	Time of passing wire.	Time of 180 Vib's.	No. of Vib.	Time of passing wire.	Time of 180 Vib's.	Torsion.	Scale divisions.	Means and differences.
	h. m. s.	m. s.		h. m. s.	m. s.			
0	5 39 08.5		9	5 39 39.7		0	39.7	
180	49 33.2	10 24.7	189	50 04.5	10 24.8	+ 90	39.8	
18	40 11.0		27	40 42.1		0	39.7	For 90°
198	50 35.6	10 24.6	207	51 06.8	10 24.7	— 90	39.6	
36	41 13.3		45	41 44.5		0	39.7	
216	51 38.0	10 24.7	225	52 09.2	10 24.7	+ 360	40.5	For 360°
54	42 15.9		63	42 47.1		0	39.6	For 90°
234	52 40.5	10 24.6	243	53 11.7	10 24.6	— 360	38.4	Adopted effect 90°
72	43 18.5		81	43 49.6		0	39.6	Torsion 0.225 Sc.Div.
252	53 43.0	10 24.5	261	54 14.2	10 24.6	$v=0'.405$		1 Sc. Div. = 1'.8
90	44 21.0		99	44 52.0		$1+\frac{h}{F}=0.000077$		
270	54 45.5	10 24.5	279	55 16.7	10 24.7			
$\frac{90}{0}$	5 12.5	60 147.6	$\frac{99}{9}$	5 12.3	60 148.1	Vertical scale, 19, 3		
Time for 180th.	49 33.5		Time for 189th.	50 04.3				
Mean		10 24.6	Time, 90 Vib.	$312^s.32$	10 24.68			
Mean time—180 vib's.		624^s 64	Time, 1 Vib.	$=T_0=$	$3^s.4702$			

Observations of vibrations, made at Curaçao, West Indies, January 26, 1890, by Ensign L. M. Garrett.

	Civil time, a. m.	Temp. of magnet.	Hor. force magnetometer.	Hor. force thermometer.
	h. m.	°		
At commencement.	10 50	29.6 C.		
At end	11 30	29.7		
Means	. . . .	29.65		
Corrected means .				

Scale moving apparently—						Torsion force.		
To the right.			To the left.					
No. of Vib.	Time of passing wire.	Time of 180 Vib's.	No. of Vib.	Time of passing wire.	Time of 180 Vib's	Torsion.	Scale divisions.	Means and differences.
	h. m. s.	*m. s.*		*h. m. s.*	*m. s.*			
0	3 11 47.8	10 24.7	9	3 12 18.9		0	39.8	
180	22 12.5		189	22 43.5	10 24.6	+90	40.0	
18	12 50.1	10 24.8	27	13 21.4		0	39.7	For 90°
198	23 14.9		207	23 46.0	10 24.6	−90	39.7	
36	13 52.6	10 24.6	45	14 23.9		0	39.8	
216	24 17.2		225	24 48.5	10 24.6	+360	40.5	For 360°
54	14 55.4	10 24.4	63	15 26.3		0	39.7	For 90°
234	25 19.8		243	25 51.0	10 24.7	−360	38.7	Adopted effect 90°
72	15 57.5	10 24.6	81	16 28.7		0	39 6	Tors'n 0.200 Sc. Div.
252	26 22.1		261	26 53.5	10 24.8	$v = 0'.360$		1 Sc. Div. = 1'.8
90	17 00	10 24.6	99	17 31.1		$1 + \frac{h}{F} = 1.000068$		
270	24 24.6		279	27 55.7	10 24.6			
90 0	05 12.4	60 147.7	99 9	05 12.2	60 147.9	Vertical scale, 16.5		
Time for 180th.	22 12.4	10 24.616	Time for 189th.		10 24.65			
Mean		10 24.633	Time, 90 Vib.	312^s.316				
Mean time—180 vib's.		624^s.633	Time, 1 Vib.	$=T_0=$	3^s.4702			

Time azimuths taken at La Guayra, Venezuela, February 13, 1890, by Ensign L. M. Garrett, with theodolite and chronometer 1596, $13^m\ 36^s.4$ slow on G. M. T.

	Before.	After.
	° ′ ″	° ′ ″
Reading of mark, A	356 45 00	356 45 00
B	176 45 30	176 45 30

Chronometer time, p. m.	Reading of circle. A.	Reading of circle. B.	Telescope.	Remarks.
h. m. s.	° ′ ″	° ′ ″		
8 23 16.0	181 28 00	1 27 30		
24 45.0	181 20 00	1 19 30		
25 31.0	181 15 00	1 15 00		
26 36.0	181 09 30	1 09 00		
27 34.0	181 03 30	1 03 30		
28 22.5	180 59 00	0 56 00		

Latitude, 10° 36′ 49″ N. Longitude, 66° 56′ 43″ W.

Solution by: $\left.\begin{array}{l}\text{Tan X} = \sin D \operatorname{cosec} S \cot \frac{1}{2} t \\ \text{Tan Y} = \cos D \sec S \cot \frac{1}{2} t \\ \text{Az} = X \pm Y\end{array}\right\}\begin{array}{l} S = \frac{1}{2}\,[p+(90^\circ-\delta)] \\ D = \frac{1}{2}\,[p+(90^\circ-\delta)]\end{array}$

Observations for declination made at La Guayra, Venezuela, February 12, 1890, by Ensign L. M. Garrett, with Kew theodolite magnetometer No. 54, with long long magnet suspended, erect.

Line of detorsion 100°.

Local time.	Scale readings.		Mean.	Azimuth circle, A 29° 18′ 00″; B 18′ 20″
a. m.	Left.	Right.		
h. m.	d.	d.		Remarks:
8 45	39.1	41.2	40.15	At 8:30 removed torsion weight and suspended magnet.
9 00	39.9	40.9	40.40	
15	40.1	40.5	40.30	
30	40.4	40.5	40.45	
45	40.6	40.7	40.65	
10 00	40.6	40.7	40.65	
15	40.7	40.7	40.70	
30	40.8	40.8	40.80	
45	40.8	40.8	40.80	
11 00	40.9	41.0	40.95	
15	40.9	41.0	40.95	Torsion weight having been suspended all night, did not remove magnet after forenoon observations.
30	40.9	41.0	40.95	
p. m.	Line of detorsion 100°			Azimuth circle, A 29° 18′ 00″; B 18′ 00″
1 00	39.7	39.7	39.70	
15	39.5	39.7	39.60	
30	39.3	39.5	39.40	
2 30	39.0	39.1	39.05	
45	38.8	39.0	38.90	
3 00	38.7	38.9	38.80	
15	38.7	38.9	38.80	
30	38.7	38.7	38.70	
45	38.8	38.8	38.80	Remarks: After last reading determined axis and scale value of magnet.

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of 10 divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
	° ′ ″							d.
0	30 29 10	17 50	E	38.8	38.8	38.80	38.90	
10	11 20	18 20	I	8.7	21.1	14.90	14.90	26.80
20	29 53 00	18 00	E	38.8	39.3	39.50	39.10	27.00
30	35 00	18 10	I	14.1	15.6	14.85	14.90	27.00
40	16 50	18 30	E	38.2	40.0	39.10	39.10	27.00
50	28 58 20	18 20	I	14.0	15.8	14.90	14.90	27.00
60	40 00	17 50	E	39.0	39.2	39.10	38.95	26.90
70	22 10	18 20						
80	03 50							
70	22 10							
60	40 00							
50	58 30							
40	29 17 00							
30	35 10							
20	53 10							
10	30 11 30							
0	29 20							
Value of one division of scale = 1′.82.			Scale reading of axis					26.95

Mean scale reading of east and west magnetic elongation . .			39.80
	° ′		
Reduction to axis	0 23.30	= difference =	12.8
Azimuth circle reads	29 18.17		
Magnetic meridian reads	29 41.47	° ′ ″	
At beginning of a. m. observations .	. . . . . .	A 280 59 00	
		B 59 20	
At end of p. m. observations	. . . . .	A 58 20	
		B 58 40	
Mean reading of mark	280 58.83	= 280 58 50	
Azimuth of mark S. of E . . .	105 53.03		
True meridian reads	26 51.86		
Magnetic declination	2 49.61	E.	

Observations for declination made at La Guayra, Venezuela, February 13, 1890, by Ensign L. M. Garrett, with Kew theodolite magnetometer No. 54, with long magnet suspended erect.

Line of detorsion, 130°.

Local time.	Scale readings.		Mean.	Azimuth circle, A / B ° ′ ″
a. m.	Left.	Right.		
h. m.	d.	d.	d.	Remarks: Removed torsion and suspended magnet at 8:45.
9 00	39.3	40.7	40.00	
15	39.8	40.6	40.20	
30	40.1	40.3	40.20	
45	40.2	40.6	40.40	
10 00	40.3	40.5	40.40	
15	40.0	41.0	40.50	
30	40.2	41.0	40.60	
45	40.4	40.8	40.60	
11 00	40.6	40.8	40.70	
15	40.7	40.9	40.80	
30	40.7	40.9	40.80	Removed magnet and suspended torsion weight.
45	40.8	40.8	40.80	
p. m.	Line of detorsion °			Azimuth circle, A 29° 18′ 50″; B 19′ 00″
2.15	38.6	41.8	40.20	Remarks: At 2:00 p. m., removed weight and suspended magnet.
30	39.7	40.7	40.20	
45	40.0	40.3	40.15	
3 00	40.0	40.3	40.15	
15	39.9	40.2	40.05	After 3:30 took readings for axis of magnet. Did not repeat scale determinations of yesterday.
30	40.0	40 2	40.10	
45	39.6	40.7	40.15	

Determination of scale value of magnet.			Determination of axis of magnet.					
Scale.	Circle readings, mean of verniers.	Value of divisions.	Scale.	Scale readings.		Mean.	Alternate mean.	Axis.
								d.
0			E	39.9	40.2	40.05		
10			I	14.0	13.2	13.60	40.10	
20			E	39.6	40.7	40.15	13.55	26.82
30			I	14.2	12.8	13.50	40.12	26.83
40			E	40.0	40.2	40.10	13.50	26.81
50			I	14.0	13.0	13.50	40.17	26.83
60			E	39.7	40.8	40.25	13.55	26.86
70							40.15	26.85
80								
70								
60								
50								
40								
30								
20								
10								
0								
Value of one division of scale = 1′.82.			Scale reading of axis					26.83

	° ′		
Mean scale reading of east and west magnetic elongation			40.42
Reduction to axis	0 24.73	= difference =	13.59
Azimuth circle reads	29 18.87		
Magnetic meridian reads	29 43.60	° ′ ″	
At beginning of a. m. observations . .	. . .	A 280 58 20	
		B 58 40	
At end of p. m. observations	. . . .	A 58 40	
		B 59 00	
Mean reading of mark	280 58.67	= 280 58 40	
Azimuth of mark S. of E.	105 53.03		
True meridian reads	26 51.70		
Magnetic declination	2 51.90 2 51.54	E.	

Observations for dip made at La Guayra, Venezuela, February 9 and 10, 1890, by Lieut. Charles Laird, with dip circle No. 84 and needle No. A 1.

[Mean by polarities.]

Polarity of marked end north.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
37 09	37 19	37 33	37 31	37 46	37 42	38 09	37 55
08	18	33	32	44	41	08	53
08.5	18.5	33	31.5	45	41.5	08.5	54
37° 13′.5		37° 32′.2		37° 43′.2		38° 01′.2	
37° 22′.8				37° 52′.2			
Mean, 37° 37′.5							

Polarity of marked end south.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
37 42	37 38	38 06	37 53	37 11	37 19	37 29	37 26
44	40	06	52	12	20	26	22
43	39	06	52.5	11.5	19.5	27.5	24
37° 41′		37° 59′.3		37° 15′.5		37° 25′.7	
37° 50′.1				37° 20′.6			
Mean, 37° 35′.3							

Resulting dip, 37° 36′.4.

February 9, 1890.	Circle in Mag. prime vertical.		
Local time of beginning, 2:30 p. m.			° ′
Local time of ending, 4:00 p. m.	Circle N.	Needle N.	76 25
Magnetic meridian reads 77° 01′.5		" S.	77 09
	Circle S.	" N.	76 53
		" S.	77 39
		Mean,	77 01.5

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
37 38	37 30	37 16	37 24	38 09	37 55	37 46	37 43
31	37	12	20	09	53	41	38
34	33.5	14	22	09	54	43.5	40.5
37° 34′		37° 18′		38° 01′.5		37° 42′	
37° 26′				37° 51′.7			
Mean, 37° 38′.8							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
38 03	37 46	37 28	37 25	37 25	37 23	37 14	37 20
01	45	25	21	24	22	08	15
02	45.5	26.5	23	24.5	22.5	11	17.5
37° 53′.7		37° 24′.7		37° 23′.5		37° 14′.2	
37° 39′.2				37° 18′.8			
Mean, 37° 29′							

Resulting dip, 27° 33′.9.

February 10, 1890.	Circle in Mag. prime vertical.		
Local time of beginning, 2:10 p. m.			° ′
Local time of ending, 4:00 p. m.	Circle N.	Needle N.	71 02
Magnetic meridian reads 71° 38′		" S.	72 32
	Circle S.	" N.	71 11
		" S.	71 47
		Mean,	71 38

Observations for dip made at La Guayra, Venezuela, February 10, 1890, by Lieut. Charles Laird, with dip circle No. 84 and needle No. A1.

[Mean by polarities.]

Polarity of marked end south.							
Circle east.				Circle west.			
Face east.		Face west.		Face east.		Face west.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
37 41	37 40	37 21	37 28	37 59	37 44	37 38	37 35
38	37	14	22	58	43	34	29
39.5	38.5	17.5	25	58.5	43.5	36	32
37° 39′		37° 21′.2		37° 51′		37° 34′	
37° 30′.1				37° 42′.5			
Mean, 37° 36′.3							

Polarity of marked end north.							
Circle west.				Circle east.			
Face west.		Face east.		Face west.		Face east.	
S.	N.	S.	N.	S.	N.	S.	N.
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
38 03	37 48	37 33	37 29	37 24	37 20	37 05	37 14
03	48	34	30	26	23	06	15
03	48	33.5	29.5	25	21.5	05.5	14.5
37° 55′.5		37° 31′.5		37° 23′.2		37° 10′	
37° 43′.5				37° 16′.6			
Mean, 37° 30′.05							

Resulting dip, 37° 33′.2.

February 10, 1890.
Local time of beginning, 1:00 p. m.
Local time of ending, 2:00 p. m.
Magnetic meridian reads 71° 48′

Circle in Mag. prime vertical.

Circle N.	Needle N.	a. m. determination.
	" S.	
Circle S.	" N.	
	" S.	

Observations for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at La Guayra, Venezuela, February 10, 1890, by Ensign L. M. Garrett, with long magnet deflecting at right angles to short magnet, suspended.

Distance $r = 0^m.300$.

Magnet.	North end.	No.	Circle readings. A.	B.	Mean.	No.	Circle readings. A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	27 39 40	40 00	39 50				
	W.					2	8 22 20	22 20	22 20
	E.	3	39 40	40 00	39 50				
	W.					4	22 20	22 20	22 20
	E.	5	39 40	39 40	39 40				
	Mean,		27° 39′ 47″				8° 22′ 20″		
West.	W.					6	8 15 00	15 10	15 05
	E.	7	27 25 20	25 20	25 20				
	W.					8	15 20	15 40	15 30
	E.	9	25 20	25 30	25 25				
	W.					10	15 40	16 00	15 50
	Mean,		27° 25′ 22″				8° 15′ 28″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} - - - - - -\right)$

	° ′ ″			Logarithms.
Magnet east, $2u =$	19 17 27			
Magnet west, $2u =$	19 09 54		$\frac{1}{2} r^3$	8. 13073
Mean,	19 13 40		Sin u	9. 22274
$u =$	9 36 50	°	$1 - \frac{P}{r^2}$	9. 99636
Time of beginning,	1:45 p. m.	Temp., 28. 5 C.	temp., etc.	0. 00487
Time of ending,	2:30 p. m.	Temp., 28. 2		
Mean,	2:04	$t = 28. 35$	$\frac{m}{H}$	7. 35470

Distance $r = 0^m.450$.

Magnet.	North end.	No.	Circle readings. A.	B.	Mean.	No.	Circle readings. A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	20 47 20	47 00	47 10				
	W.					2	15 07 00	7 00	7 00
	E.	3	47 00	47 00	47 00				
	W.					4	06 40	6 20	6 30
	E.	5	47 00	47 20	47 10				
	Mean,		20° 47′ 07″				15° 06′ 45″		
West.	W.					6	15 06 20	06 00	06 10
	E.	7	20 44 40	44 20	44 30				
	W.					8	06 20	06 00	06 10
	E.	9	44 40	44 20	44 30				
	W.					10	06 20	06 00	06 10
	Mean,		20° 44′ 30″				15° 06′ 10″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} - - - - - -\right)$

	° ′ ″			Logarithms.
Magnet east, $2u =$	5 41 22			
Magnet west, $2u =$	5 38 20		$\frac{1}{2} r^3$	8. 95900
Mean,	5 49 51		Sin u	8. 69378
$u =$	2 49 55	°	$1 - \frac{P}{r^2}$	9. 99839
Time of beginning,	2:40 p. m.	Temp., 28. 0 C.	temp., etc.	0. 00469
Time of ending,	3:12 p. m.	Temp., 28. 0		
Mean,	2:56	$t = 28. 0$	$\frac{m}{H}$	7. 35586

Observations for horizontal intensity by the method of deflections with Kew theodolite magnetometer No. 54, at La Guayra, Venezuela. February 11, 1890, by Ensign L. M. Garrett, with long magnet deflecting at right angles to short magnet, suspended.

Distance $r = 0^m.300$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean.
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	262 10 40	10 50	10 45				
	W.					2	242 54 00	54 00	54 00
	E.	3	10 40	11 00	10 50				
	W.					4	54 00	54 20	54 10
	E.	5	10 40	11 10	10 55				
	Mean,		262° 10′ 50″				242° 54′ 05″		
West.	W.					6	242 48 00	48 10	48 05
	E.	7	261 55 40	56 00	55 50				
	W.					8	48 00	48 10	48 05
	E.	9	55 40	56 00	55 50				
	W.					10	48 00	48 10	48 05
	Mean,		261° 55′ 50″				242° 48′ 05″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} - - - - - -\right)$

	° ′ ″		Logarithms.
Magnet east, $2u =$	19 16 45		
Magnet west, $2u =$	19 07 45	$\frac{1}{2}r^3$	8. 13073
Mean,	19 12 15	Sin u	9. 22221
$u =$	9 36 08	$1 - \frac{P}{r^2}$	9. 99763
Time of beginning, 1:15 p. m.	Temp., 28°. 5 C.	temp., etc.	0. 00487
Time of ending, 2:10 p. m.	Temp., 28. 2		
Mean, 1:42.5	$t =$ 28. 35	$\frac{m}{H}$	7. 35544

Distance $r = 0^m.450$.

Magnet.	North end.	No.	A.	B.	Mean.	No.	A.	B.	Mean
			° ′ ″	′ ″	′ ″		° ′ ″	′ ″	′ ″
East.	E.	1	255 17 30	18 00	17 45				
	W.					2	249 37 30	38 00	37 45
	E.	3	17 40	18 00	17 50				
	W.					4	37 40	38 00	37 50
	E.	5	17 30	18 10	17 50				
	Mean,		255° 17′ 48″				249° 37′ 47″		
West.	W.					6	249 36 30	37 00	36 45
	E.	7	255 14 50	15 20	15 05				
	W.					8	36 50	37 20	37 05
	E.	9	14 40	15 20	15 00				
	W.					10	36 40	37 10	36 55
	Mean,		255° 15′ 02″				249° 36′ 55″		

Computation: $\frac{m}{H} = \frac{1}{2} r^3 \sin u \left(1 - \frac{P}{r^2} - - - - - -\right)$

	° ′ ″		Logarithms.
Magnet east, $2u =$	5 40 01		
Magnet west, $2u =$	5 38 07	$\frac{1}{2}r^3$	8. 65900
Mean,	5 39 04	Sin u	8. 69280
$u =$	2 49 32	$1 - \frac{P}{r^2}$	9. 99895
Time of beginning, 2:15 p. m.	Temp., 28°. 0 C.	temp., etc.	0. 00466
Time of ending, 3:10 p. m.	Temp., 27. 5		
Mean, 2:42.5	$t =$ 27. 75	$\frac{m}{H}$	7. 35541

Observations of vibrations, made at La Guayra, Venezuela, February 10, 1890, by Ensign L. M. Garrett.

Chro. error, $13^{m}\ 31^{s}.2$ slow. Daily rate, $1^{s}.55$ losing.

	Civil time, a. m.	Temp. of magnet.	Hor. force magnetometer.	Hor. force thermometer.
	h. *m.*	°		
At commencement.	10 00	28.5 C.		
At end	10 35	29.0		
Means	. . . . . .	28.75		
Corrected means .				

Scale moving apparently—						Torsion force.		
To the right.			To the left.					
No. of Vib.	Time of passing wire.	Time of 180 Vib's.	No. of Vib.	Time of passing wire.	Time of 180 Vib's.	Torsion.	Scale divisions.	Means and differences.
	h. m. s.	*m. s.*		*h. m. s.*	*m. s.*			
0	2 33 14.5		9	2 33 46.0		0	40.5	
180	43 40.5	10 26.0	189	44 11.9	10 25.9	+ 90	41.0	
18	34 17.3		27	34 48.5		0	40.5	For 90°, 0.5
198	44 43.2	10 25.9	207	45 14.5	10 26.0	— 90	40.0	
36	35 19.7		45	35 51.0		0	40.5	
216	45 45.7	10 26.0	225	46 17.0	10 26.0	+ 360	42.5	For 360°, 2.05
54	36 22.4		63	36 53.6		0	40.5	For 90°, 0.51
234	46 48.5	15 26.1	243	47 19.5	10 25.9	— 360	38.4	Adopted effect 90°
72	37 25.0		81	37 56.3		0	40.5	Torsion 0.50 Sc.Div.
252	47 51.0	10 26.0	261	48 22.2	10 25.9	$v = 0'.90$		1 Sc. Div. $= 1'.8$
90	38 27.6		99	38 59.0				
270	48 53.5	10 25.9	279	49 24.8	10 25.8	$1 + \frac{h}{F} = 1.00017$		
$\frac{90}{0}$	05 13.1	60 15.59	$\frac{99}{9}$	5 13	60 155.5	Vertical scale, 20.7		
Time for 180th.	2 43 40.7	10 25.98	Time for 189th.	2 44 12	10 25.92			
Mean,		10 25.95	Time, 90 Vib.	$312^{s}.975$				
Mean time—180 vib's.		625.95	Time, 1 Vib.	$= T_0 =$	$3^{s}.4775$			

The computation of the results of the observations for magnetic intensity, dip, and variation gives the following values:

Locality.	Date.	Dec. E.	Dip.	Horizontal intensity (British units).
		° ′	° ′	
Vera Cruz, Mexico	Dec., 1888	7 13	44 20	. . .
Coatzacoalcos, Mexico	Feb., 1889	6 53	43 3	7.2890
Salina Cruz, Mexico	Mar., 1889	6 59	40 2	7.4300
Port Plata, San Domingo . . .	Dec., 1889	0 37	49 50	6.6667
Curaçao, West Indies	Jan., 1890	2 28	39 13	6.9841
La Guayra, Venezuela	Feb., 1890	2 51	37 35	6.9496

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